



DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE-2021-BT-TP-0007]

RIN 1904-AE67

Energy Conservation Program: Test Procedure for Refrigerated Bottled or Canned Beverage Vending Machines

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (DOE) amends the test procedures for refrigerated bottled or canned beverage vending machines (BVMs) to reference the latest version of the industry standard, while maintaining certain provisions specified in the current DOE test procedure. DOE also provides setup instructions for non-beverage shelves, updates the lowest application product temperature definition and test instructions, specifies setup instructions for refrigeration leak mitigation controls, and removes the obsolete test procedure.

DATES: The effective date of this rule is [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. The amendments will be mandatory for equipment testing starting [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

The incorporation by reference of certain material listed in the rule is approved by the Director of the Federal Register on [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. The incorporation by reference of certain other material listed in the rule was approved by the Director of the Federal Register on March 8, 2016.

ADDRESSES: The docket, which includes *Federal Register* notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as those containing information that is exempt from public disclosure.

A link to the docket webpage can be found at www.regulations.gov/docket/EERE-2021-BT-TP-0007. The docket webpage contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: ApplianceStandardsQuestions@ee.doe.gov.

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SUPPLEMENTARY INFORMATION: DOE maintains a previously approved incorporation by reference and incorporates by reference the following industry standards into part 431:

AHAM HRF-1-2016, “Energy and Internal Volume of Refrigerating Appliances.”

ANSI/ASHRAE Standard 32.1-2022, “Methods of Testing for Rating Refrigerated Vending Machines for Sealed Beverages,” approved December 30, 2022.

Copies of AHAM HRF-1-2016 can be purchased from the Association of Home Appliance Manufacturers (AHAM), 1111 19th Street NW, Suite 402, Washington, DC 20036, 202-872-5955, www.aham.org/AHAM/Store.

Copies of ANSI/ASHRAE Standard 32.1-2022 can be purchased from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Inc., 180 Technology Parkway, NW, Peachtree Corners, GA 300092, (800) 527-4723, webstore.ansi.org.

For a further discussion of these standards, see section IV.N of this document.

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I. Authority and Background

DOE is authorized to establish and amend energy conservation standards and test procedures for BVMs. (42 U.S.C. 6295(v); 42 U.S.C. 6293(b)(15)) DOE's energy conservation standards and test procedures for BVMs are currently prescribed at subpart Q of 10 CFR part 431. The following sections discuss DOE's authority to establish test procedures for BVMs and relevant background information regarding DOE's consideration of test procedures for this product.

A. Authority

The Energy Policy and Conservation Act, Pub. L. 94-163, as amended (EPCA),¹ authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B of EPCA² established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include BVMs, the subject of this document. (42 U.S.C. 6295(v))³

¹ All references to EPCA in this document refer to the statute as amended through the Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021), which reflect the last statutory amendments that impact Parts A and A-1 of EPCA.

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

³ Because Congress included BVMs in Part A of Title III of EPCA, the consumer product provisions of Part A (rather than the industrial equipment provisions of Part A-1) apply to BVMs. DOE placed the regulatory requirements specific to BVMs in 10 CFR part 431, "Energy Efficiency Program for Certain

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The testing requirements consist of test procedures that manufacturers of covered products must use as the basis for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section shall be

Commercial and Industrial Equipment,” as a matter of administrative convenience based on their type and therefore refers to BVMs as “equipment” throughout this document. Despite the placement of BVMs in 10 CFR part 431, the relevant provisions of Title A of EPCA and 10 CFR part 430, which are applicable to all product types specified in Title A of EPCA, are applicable to BVMs. *See* 74 FR 44914, 44917 (Aug. 31, 2009) and 80 FR 45758, 45759 (Jul. 31, 2015). The regulatory provisions of 10 CFR 430.33 and 430.34 and subparts D and E of 10 CFR part 430 are applicable to BVMs. Because the procedures in 10 CFR parts 430 and 431 for petitioning DOE for obtaining a test procedure waiver are substantively the same (79 FR 26591, 26601 (May 9, 2014)), the regulations for applying for a test procedure waiver for BVMs are those found at 10 CFR 431.401 rather than those found at 10 CFR 430.27.

reasonably designed to produce test results which measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle (as determined by the Secretary) or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (IEC) Standard 62301⁴ and IEC Standard 62087⁵ as applicable. (42 U.S.C. 6295(gg)(2)(A))

With respect to BVMs, EPCA requires the test procedure to be based on the 2004 version of ANSI/ASHRAE Standard 32.1, “Methods of Testing for Rating Vending Machines for Bottled, Canned or Other Sealed Beverages.” (42 U.S.C. 6293(b)(15))

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including BVMs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated

⁴ IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

⁵ IEC 62087, *Audio, video, and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures. (42 U.S.C. 6293(b)(1)(A)(ii))

DOE is publishing this final rule in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

B. Background

DOE's existing test procedures for BVMs appear at 10 CFR part 431, subpart Q, appendices A and B, both titled "Uniform Test Method for the Measurement of Energy Consumption of Refrigerated Bottled or Canned Beverage Vending Machines" (appendices A and B, respectively). On or after January 8, 2019, any representations, including compliance certifications, made with respect to the energy use or efficiency of BVMs must be made in accordance with the results of testing pursuant to appendix B.

On July 31, 2015, DOE published a test procedure final rule (July 2015 Final Rule) that referenced updated industry test methods, improved clarity of the procedure, accounted for new equipment features, and established the test procedures at appendices

A and B.⁶ 80 FR 45758; *see also* 81 FR 1028 (January 8, 2016). The specific amendments in the July 2015 Final Rule included, for both appendices A and B: (1) updating the referenced test method to ANSI/ASHRAE Standard 32.1-2010, “Methods of Testing for Rating Vending Machines for Sealed Beverages,” (ANSI/ASHRAE Standard 32.1-2010), (2) incorporating amendments to clarify several ambiguities in ANSI/ASHRAE Standard 32.1-2010, (3) eliminating the requirement to test at the 90-degree Fahrenheit (°F) ambient test condition, (4) clarifying the test procedure for combination vending machines, (5) clarifying the requirements for the loading of BVMs under the DOE test procedure, (6) specifying the characteristics of a standard test package, (7) clarifying the average next-to-vend beverage temperature test condition, (8) specifying placement of thermocouples during the DOE test procedure, (9) establishing provisions for testing at the lowest application product temperature, (10) clarifying the treatment of certain accessories during the DOE test procedure, and (11) clarifying the certification and reporting requirements for covered BVMs. 80 FR 45758, 45760. The July 2015 Final Rule also incorporated amendments in appendix B to account for the impact of low power modes on the measured daily energy consumption (DEC) of BVMs. *Id.*

On May 19, 2021, DOE published in the *Federal Register* an early assessment request for information (May 2021 RFI) seeking comments on the existing DOE test procedure for BVMs. 86 FR 27054. On March 31, 2022, DOE published in the *Federal Register* a notice of proposed rulemaking (NPR) that proposed to update the test procedure at appendix B (March 2022 NPR). 87 FR 18936. In the March 2022 NPR, DOE proposed the following amendments and requested feedback on these proposals:

⁶ As discussed further in this section, the test procedure at appendix B accounts for additional BVM operating modes not accounted for in appendix A and is mandatory for demonstrating compliance with the energy conservation standards in 10 CFR 431.296(b), which are required for BVMs manufactured on or after January 8, 2019.

- (1) Incorporate by reference the current industry standard ANSI/ASHRAE Standard 32.1-2017.
- (2) Incorporate by reference the industry standard AHAM HRF-1-2008 referenced in ANSI/ASHRAE Standard 32.1-2017.
- (3) Maintain the existing DOE test procedure requirements that are not included in ANSI/ASHRAE Standard 32.1-2017.
- (4) Provide setup instructions for non-beverage shelves in refrigerated compartments.
- (5) Amend the definition of lowest application product temperature (LAPT) to allow for testing BVMs only capable of operating at temperatures below the specified test temperature.
- (6) Require coin and bill payment mechanisms to be energized for testing if shipped with the BVM (but not until the compliance date of any amended energy conservation standards).
- (7) Specify setup instructions for refrigerant leak mitigation controls consistent with the existing test procedure instructions.
- (8) Remove the obsolete test procedure in appendix A.

87 FR 18936.

DOE received comments in response to the March 2022 NOPR from the interested parties listed in Table I.I.

Table I.I List of Commenters with Written Submissions or Oral Comments in Response to the March 2022 NOPR

Commenter(s)	Reference in this Final Rule	Reference No. in the Docket	Commenter Type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	12*	Trade Association
Appliance Standards Awareness Project; American Council for an Energy-Efficient Economy; Northwest Energy Efficiency Alliance	Joint Commenters	13	Efficiency Advocates
National Automatic Merchandising Association	NAMA	14	Trade Association
Steven Neubauer	Neubauer	9	Individual

* Document number 12 is the transcript of the webinar. Commenter did not submit written comments.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.⁷ To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the May 2, 2022, public meeting (hereafter, the NOPR public meeting), DOE cites the written comments throughout this final rule.

II. Synopsis of the Final Rule

In this final rule, DOE amends the test procedure at appendix B as follows:

- (1) Incorporates by reference the current industry standard ANSI/ASHRAE Standard 32.1-2022.
- (2) Incorporates by reference the industry standard AHAM HRF-1-2016 referenced in ANSI/ASHRAE Standard 32.1-2022.

⁷ The parenthetical reference provides a reference to information located in the docket of DOE's rulemaking to develop test procedures for refrigerated bottled or canned beverage vending machines (Docket No. EERE-2021-BT-TP-0007, which is maintained at www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

- (3) Provides setup instructions for non-beverage shelves in refrigerated compartments.
- (4) Amends the definition of LAPT to allow for testing BVMs only capable of operating at temperatures below the specified test temperature.
- (5) Specifies setup instructions for refrigerant leak mitigation controls.
- (6) Removes the obsolete test procedure in appendix A.

The adopted amendments are summarized and compared to the test procedure provision prior to the amendment in Table II.I, along with the reason for the adopted change.

Table II.I Summary of Changes in the Amended Test Procedure

DOE Test Procedure Prior to Amendment	Amended Test Procedure	Attribution
Incorporates by reference ANSI/ASHRAE Standard 32.1-2010	Incorporates by reference ANSI/ASHRAE Standard 32.1-2022	Harmonizes with most recent industry test method
Refers to Appendix C of ANSI/ASHRAE Standard 32.1-2010, which references ANSI/AHAM HRF-1-2004, for measurement of refrigerated volume	Incorporates by reference AHAM HRF-1-2016 for measurement of refrigerated volume, as referenced in Appendix C of ANSI/ASHRAE Standard 32.1-2022	Incorporates by reference industry test method required for testing
Does not specifically address loading of non-beverage merchandise shelves within the refrigerated compartment	Specifies that non-beverage merchandise shelves within the refrigerated compartment are unloaded for testing	Improves representativeness and reproducibility
Defines LAPT only for units that operate at temperatures above the test condition	Adds a definition for LAPT and test instructions for units that can only operate below the test condition	Improves representativeness and reproducibility
Generally requires components necessary for primary functionality to be energized and those not necessary for primary functionality to be de-energized for testing	Specifies that refrigerant leak mitigation controls must be disconnected, disabled, or otherwise de-energized for the duration of testing, unless integrated into the cabinet or controls such that they cannot be de-energized without disabling the refrigeration or vending functions and must be placed in external accessory standby mode, if available, or their lowest energy-consuming state.	Improves representativeness
Includes appendix B required for testing current BVMs and appendix A, which is now obsolete	Removes obsolete appendix A	Improves readability

DOE has determined that the amendments described in section III of this document and adopted in this document will not alter the measured efficiency of BVMs or require retesting or recertification solely as a result of DOE's adoption of the

amendments to the test procedures. Additionally, DOE has determined that the amendments will not increase the cost of testing. Discussion of DOE's actions are addressed in detail in section III of this document.

The effective date for the amended test procedures adopted in this final rule is 30 days after publication of this document in the *Federal Register*. Representations of energy use or energy efficiency must be based on testing in accordance with the amended test procedures beginning 180 days after the publication of this final rule.

III. Discussion

A. Scope and Definitions

BVMs are commercial refrigerators (as defined at 10 CFR 431.62⁸) that cool bottled or canned beverages and dispense the bottled or canned beverages on payment. 10 CFR 431.292. The defined equipment classes for BVMs include Class A, Class B, Combination A, and Combination B.

Class A means a BVM that is not a combination vending machine and in which 25 percent or more of the surface area on the front side of the beverage vending machine is transparent.

Class B means a BVM that is not considered to be Class A and is not a combination vending machine.

Combination A means a combination vending machine where 25 percent or more of the surface area on the front side of the beverage vending machine is transparent.⁹

⁸ As defined in 10 CFR 431.62, "commercial refrigerator" means a unit of commercial refrigeration equipment in which all refrigerated compartments in the unit are capable of operating at or above 32 °F (±2 °F).

⁹ As provided in 10 CFR 429.134(j)(2), the determination of percent transparent surface does not include the surface area surrounding any compartments that are not designed to be refrigerated (as demonstrated by the presence of temperature controls), whether or not it is transparent.

Combination B means a combination vending machine that is not considered to be Combination A.

Combination vending machine means a BVM containing two or more compartments separated by a solid partition, that may or may not share a product delivery chute, in which at least one compartment is designed to be refrigerated, as demonstrated by the presence of temperature controls, and at least one compartment is not.
10 CFR 431.292.

In the March 2022 NOPR, having received no comments on these definitions, and having not identified any BVMs available on the market that would require additional specificity in the existing BVM definitions, DOE tentatively determined that amendments were not required and did not propose any new or amended BVM definitions.¹⁰ 87 FR 18963, 18940.

In response to the March 2022 NOPR, NAMA commented that it does not believe further definition of the terms “dispense” or “solid partition” is necessary. (NAMA, No. 14, p. 2)

DOE has not identified BVMs available on the market that would require additional specificity in the existing BVM definitions, which is supported by NAMA’s comment. Therefore, consistent with the March 2022 NOPR, DOE has determined that amendments are not required and is not amending any of the BVM definitions in this final rule.

B. Updates to Industry Standards

¹⁰ DOE notes that the regulatory text in the March 2022 NOPR inadvertently included a new definition for *V*, refrigerated volume, at 10 CFR 431.292. DOE did not discuss this term in the preamble to the March 2022 NOPR and stated explicitly that DOE was not proposing any new or amended BVM definitions. 87 FR 18936, 18939.

Appendix B incorporates by reference ANSI/ASHRAE Standard 32.1-2010, which was the most current version of the industry standard available at the time of the July 2015 Final Rule. 80 FR 45758, 45762. Appendix B specifically references section 3, “Definitions”; section 4, “Instruments”; section 5, “Vendible Capacity”; section 6, “Test Conditions”; section 7.1, “Test Procedures – General Requirements”; and section 7.2, “Energy Consumption Test” of ANSI/ASHRAE Standard 32.1-2010. Appendix B includes certain exceptions to these references, and in cases of conflict between appendix B language and the requirements of ANSI/ASHRAE Standard 32.1-2010, the language in appendix B takes precedence. *See* section 1 of appendix B.

At the time of the July 2015 Final Rule analysis, DOE was aware of ongoing industry meetings to consider updates to ASHRAE Standard 32.1. DOE participated in those industry meetings and, to the extent possible, sought to align its test procedure with the expected updates to ASHRAE 32.1. 80 FR 45758, 45762.

On February 2, 2017, ANSI and ASHRAE approved the latest version of Standard 32.1, ANSI/ASHRAE 32.1-2017, “Methods of Testing for Rating Vending Machines for Sealed Beverages” (ANSI/ASHRAE Standard 32.1-2017).

Many of the revisions included in ANSI/ASHRAE Standard 32.1-2017 harmonize the industry standard with the existing DOE test procedure. However, some substantive differences between DOE’s test procedure at appendix B and ANSI/ASHRAE Standard 32.1-2017 remain, notably the following:

(1) Section 2.2.4 of appendix B contains provisions for testing accessory low power mode, and section 2.3.2 of appendix B accounts for refrigeration low power mode, whereas ANSI/ASHRAE Standard 32.1-2017 contains no such provisions (and

specifically prohibits operation in low power mode during testing, per section 7.2.2.6.2).

See section III.C.6 of this document for additional discussion of low power modes.

(2) Section 2.1.3 of appendix B provides instructions for testing BVMs that are not capable of maintaining an integrated average temperature of $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ during the 24-hour test period, whereas ANSI/ASHRAE Standard 32.1-2017 contains no such provisions. *See* section II.C.4 of this document for additional discussion of lowest application product temperatures.

(3) Section 2.2.1.4 of appendix B specifies a “standard product” consisting of standard 12-ounce aluminum beverage cans filled with a liquid with a density of 1.0 grams per milliliter (g/mL) $\pm 0.1 \text{ g/mL}$ at 36°F , whereas ANSI/ASHRAE Standard 32.1-2017 specifies using a 33 percent propylene glycol and 67 percent water solution. *See* section II.C.3 of this document for additional discussion of standard product characteristics.

(4) Section 2.2.5.1 of appendix B provides instructions for payment mechanisms that cannot be disconnected during testing (if the payment mechanism is not removed, appendix B requires it to be in place but de-energized, or set to the lowest energy-consuming state if it cannot be de-energized) and specifies a default payment mechanism energy consumption of 0.20 kilowatt-hours per day (kWh/day), whereas ANSI/ASHRAE Standard 32.1-2017 contains no such provisions. *See* section II.C.5 of this document for additional discussion of payment mechanisms.

(5) Section 2.2.3 of appendix B requires energy management systems to be disabled and energy-saving features that cannot be disabled to be set to their most energy-consuming settings, whereas ANSI/ASHRAE Standard 32.1-2017 also requires that energy management systems be disabled but does not address other energy-saving features that cannot be disabled.

(6) Sections 2.2.5.2 through 2.2.5.10 of appendix B provide additional setup instructions regarding certain equipment accessories (*i.e.*, internal lighting; external customer display signs, lights, and digital screens; anti-sweat or other electric resistance heaters; condensate pan heaters and pumps; illuminated temperature displays; condensate filters; security covers; general purpose outlets; and crankcase heaters and other electric resistance heaters for cold weather), whereas ANSI/ASHRAE Standard 32.1-2017 provides instructions for only a subset of these accessories (*i.e.*, video screens and lighting).

(7) Section 2.2.2 of appendix B prohibits routing thermocouple wires and other measuring equipment through the dispensing door, whereas ANSI/ASHRAE Standard 32.1-2017 contains no such prohibition (only that they be installed in a manner that does not affect energy performance).

(8) Section 2.3.3 of appendix B provides rounding instructions on energy consumption results, whereas ANSI/ASHRAE Standard 32.1-2017 contains no such rounding instructions.

(9) ANSI/ASHRAE Standard 32.1-2017 provides an additional recovery test (to determine the product temperature recovery time of the BVM when loaded with product at a certain temperature) and a vend test (to determine how much cold product a BVM will deliver when bottles, cans, or other sealed packages are vended at a rate of two per minute, 3 hours after a half-full machine is refilled with product at a specified beverage temperature), whereas appendix B contains no such tests. These tests assess product temperature recovery and vending performance but do not factor into the energy use measurement in ANSI/ASHRAE Standard 32.1-2017.

In addition to these differences with the DOE test procedure, ANSI/ASHRAE Standard 32.1-2017 also lists key changes from the 2010 version, summarized by the following:

- Updates definitions to specify the application to BVMs;
- Removes zone-cooled/fully cooled distinction;
- Updates AHAM HRF-1 references to a more recent version of the standard (2008);
- Removes the 90 °F test condition for ambient temperature and maintains a single ambient temperature (75 °F);
- Clarifies test setup requirements for temperature sensor locations and test package/wire setup;
- Incorporates requirements for the controls systems; and
- Clarifies the integrated average temperature (IAT) calculation.

In the March 2022 NOPR, DOE proposed to incorporate by reference the most recent updated industry standard, ANSI/ASHRAE Standard 32.1-2017, while maintaining the current DOE test procedure provisions not included in ANSI/ASHRAE Standard 32.1-2017 regarding energy management systems, accessory setup instructions, wire routing, and rounding. 87 FR 18936, 18941. This proposed approach was consistent with the recommendations from interested parties, and DOE tentatively determined that the proposal would not impact current BVM ratings or test costs because the proposed test procedure was substantively the same as the current DOE test procedure. *Id.*

For consistency with the proposed incorporation by reference of ANSI/ASHRAE Standard 32.1-2017, DOE also proposed in the March 2022 NOPR to incorporate by reference AHAM HRF-1-2008, including the correction sheet issued November 17, 2009, to ensure that BVM testing is conducted to the appropriate test standard. 87 FR 18936, 18941. In the March 2022 NOPR, DOE tentatively determined that the updates made to AHAM HRF-1 between the 2004 and 2008 versions provided clarifications and instructions for measuring components that are specific to consumer refrigeration

products (*e.g.*, consideration of through-the-door ice and water dispensers) and that current refrigerated volume measurements and ratings for BVMs would be unchanged under the proposed updated industry standard reference. *Id.*

In the March 2022 NOPR, DOE requested comment on its proposal to incorporate by reference the most current industry test standard, ANSI/ASHRAE Standard 32.1-2017, including the updated reference to AHAM HRF-1-2008 for measuring refrigerated volume. 87 FR 18936, 18941. DOE also requested comment on whether the proposed amendments would affect BVM ratings as measured under the existing test procedure or whether they would impact test burden. *Id.*

NAMA expressed agreement with DOE that updating the references to AHAM HRF-1-2008 and ANSI/ASHRAE 32.1-2017 is more appropriate. (NAMA, No. 14, p. 2) NAMA also stated that referencing AHAM HRF-1-2008 would help clarify some of the dimensional volume measurements. (NAMA, No. 14, p. 2-3)

Since publication of the March 2022 NOPR, the first public review draft of Board of Standards Review/ASHRAE Standard 32.1-2017R (BSR/ASHRAE 32.1-2017R) was published on April 22, 2022.¹¹ The only change in comparison to the 2017 version of the standard is an update of the AHAM HRF-1 reference to the 2016 version. DOE submitted comments to suggest harmonization with the March 2022 NOPR test procedure and inclusion of the most current version of referenced standards, as a more recent version of AHAM HRF-1 (2019) has been published.

On December 30, 2022, ANSI/ASHRAE 32.1-2022 was published. DOE reviewed ANSI/ASHRAE 32.1-2022 and determined that it is substantively the same to BSR/ASHRAE 32.1-2017R. DOE has reviewed the sections in AHAM HRF-1-2016 referenced by ANSI/ASHRAE 32.1-2022 and determined that the updated reference in

¹¹ Information on BSR/ASHRAE Standard 32.1-2017R can be found at www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20actions/saapr222022.pdf.

ANSI/ASHRAE 32.1-2022 to AHAM HRF-1-2016 provides clarifications and does not substantively change the standard. Based on this determination, incorporating by reference ANSI/ASHRAE 32.1-2022 and AHAM HRF-1-2016 would be substantively consistent with DOE's proposal in the March 2022 NOPR and, therefore, DOE has determined to incorporate by reference ANSI/ASHRAE 32.1-2022 and AHAM HRF-1-2016, while maintaining the current DOE test procedure provisions not included in ANSI/ASHRAE Standard 32.1-2022 regarding energy management systems, accessory setup instructions, wire routing, and rounding.

C. Test Procedure

The following sections discuss the proposals from the March 2022 NOPR, any comments received in response to the proposals, and any corresponding finalized amendments to the DOE test procedure.

1. Ambient Test Conditions

Section 2.1.2 of appendix B requires testing and rating BVM performance in a 75 °F ambient temperature with 45 percent relative humidity. Prior to the July 2015 Final Rule, the DOE test procedure incorporated by reference ANSI/ASHRAE Standard 32.1-2004, which included two ambient test conditions: 75 °F with 45 percent relative humidity and 90 °F with 65 percent relative humidity. However, compliance with DOE's energy conservation standard was determined based on performance at only the 75 °F with a 45 percent relative humidity test condition. In the July 2015 Final Rule, DOE determined that the 75 °F with a 45 percent relative humidity test condition provides a reasonable and comparable representation of energy performance for all BVMs and removed the 90 °F with a 65 percent relative humidity condition. 80 FR 45758, 45765.

During the rulemaking leading to the July 2015 Final Rule, DOE estimated that 18 percent of Class B and Combination B BVMs were installed outdoors. 80 FR 45758, 45765. DOE determined that, although these BVMs would experience different ambient

conditions than in the test procedure, it would not be feasible to test at all the conditions BVMs may experience in the field. *Id.* In ANSI/ASHRAE Standard 32.1-2017, the 90 °F with a 65 percent relative humidity test condition for the energy consumption test was removed, and the industry test standard designated the 75 °F with a 45 percent relative humidity test condition as the singular test condition.

In the March 2022 NOPR, DOE tentatively determined that while BVMs may be installed and operated in a variety of locations and ambient conditions, the existing single test condition provides a representative test condition for BVMs, consistent with the July 2015 Final Rule determination. Accordingly, DOE did not propose any changes to the current requirement to test under the single ambient test condition (75 °F and 45 percent relative humidity), consistent with the test condition specified in ASHRAE Standard 32.1-2022. 87 FR 18936, 18941.

In response to the March 2022 NOPR, NAMA commented that removal of the requirement to test at both 75 degrees and 90 degrees was appropriate and would assist manufacturers in reducing testing costs and would not change the overall energy measurement. (NAMA, No. 14, p. 2) NAMA also expressed agreement with DOE that testing at 75 degrees and 45 percent relative humidity is realistic and provides a reasonable and comparable representation of energy performance. (NAMA, No. 14, p. 3) NAMA also commented that it could not present information about the percentage of machines installed indoors, outdoors, in insulated environments, or in space-conditioned indoor environments. (NAMA, No. 14, p. 3) NAMA explained that BVM manufacturers do not determine placement of machines; rather, the customers of the BVM manufacturer and individual bottlers or store locations make that determination, and such information is not shared with the BVM manufacturer. *Id.*

Neubauer commented that many BVMs are placed outdoors in uncontrolled environments, such that the previous initial test at 90 °F ambient temperature was

reasonable and sound. (Neubauer, No. 9, p. 1) Neubauer added that many customers prefer a colder drink, especially in hot environments. *Id.* Neubauer also commented that manufacturers make a wide variety of BVM models and that eliminating the 90 °F condition potentially eliminated a competitive advantage of manufacturers who design vending machines specifically for high ambient conditions. Neubauer added that requiring the 90 °F ambient temperature test would encourage BVM manufacturers to continue to design these machines efficiently for their intended use case. *Id.*

While acknowledging that a 90 °F ambient temperature may represent certain BVM installations, DOE recognizes that BVMs may be installed and operated in a variety of locations and ambient conditions (including temperatures significantly lower than the aforementioned test conditions). In consideration of these factors, DOE reiterates and maintains its previous determination that the existing single test condition provides for a representative measurement of energy use for BVMs and is not unduly burdensome to conduct. Accordingly, in this final rule, DOE is not making any changes to the current requirement to test under the single ambient test condition (75 °F and 45 percent relative humidity), consistent with the test condition specified in ASHRAE Standard 32.1-2022.

2. Test Procedure for Combination BVMs

As described in section III.A of this document, DOE defines “combination BVM” as a BVM containing two or more compartments separated by a solid partition, that may or may not share a product delivery chute, in which at least one compartment is designed to be refrigerated, as demonstrated by the presence of temperature controls, and at least one compartment is not. 10 CFR 431.292. The thermal mass of items loaded into the non-refrigerated compartments (or lack of thermal mass for unloaded compartments) may affect the measured DEC of combination BVMs. Section 2.2.1.3 of appendix B specifies

that the non-refrigerated compartments of combination BVMs must not be loaded with any standard products or other vendible merchandise during testing. Sections 7.2.2.2 and 7.2.2.7 of ANSI/ASHRAE Standard 32.1-2022 require combination BVMs not to be loaded with any standard products, test packages, or other vendible merchandise in the non-refrigerated compartments.

In the March 2022 NOPR, DOE requested information on typical loads for non-refrigerated compartments in combination BVMs and, if DOE were to require such loads for testing, the potential impacts on combination BVM energy consumption and test burden. 87 FR 18936, 18942.

In response to the March 2022 NOPR, NAMA commented that many machines are configured for both “snacks” and “beverages” and agreed that testing or designing a “standard” thermal mass for testing non-beverage items is difficult and would not provide better information than the test procedure DOE proposed. (NAMA, No. 14, p. 3) NAMA also commented that estimating the thermal characteristics by using no-filled space for non-beverage materials is best, and stated that the method proposed by DOE is a representative, reasonable, and reproducible approach. *Id.*

NAMA also commented that BVM manufacturers do not dictate what non-beverage materials are placed into the machines; rather, placement of non-beverage materials is dictated by the end user, and therefore BVM manufacturers do not have information on this and would not be able to provide this to DOE. (NAMA, No. 14, p. 3)

As stated in the March 2022 NOPR, typical loads for non-refrigerated compartments can range from small items with density similar to beverages (*e.g.*, chocolate bars) to larger low-density items (*e.g.*, bags of chips). 87 FR 18936, 18942. Given the wide range of products stored in non-refrigerated compartments and BVM manufacturers’ lack of information regarding end users’ products, as stated in NAMA’s

comment, DOE has not identified a typical representative load for these compartments. Additionally, DOE acknowledges that loading non-refrigerated compartments in a consistent, repeatable manner may be difficult due to the range of shelf configurations in those compartments. DOE did not identify a standard package that could be consistently loaded into non-refrigerated shelves for testing and has determined that requiring such a load would introduce additional test burden compared to the existing unloaded approach. In consideration of these factors, DOE has determined that the current test procedure provides a representative, repeatable, and reproducible approach for testing combination BVMs while minimizing test burden. Accordingly, DOE is not requiring a load in non-refrigerated compartments, consistent with the proposed approach in the March 2022 NOPR.

3. Characteristics of the Standard Product

Section 2.2.1.4 of appendix B specifies the standard products to be used for testing, which include the following: 12-ounce aluminum beverage cans filled with a liquid with a density of 1.0 grams per milliliter (g/mL) ± 0.1 g/mL at 36 °F; or, for product storage racks that are not capable of vending 12-ounce cans but are capable of vending 20-ounce bottles, 20-ounce plastic bottles filled with a liquid with a density of 1.0 g/mL ± 0.1 g/mL at 36 °F; or, for product storage racks that are not capable of vending 12-ounce cans or 20-ounce bottles, the packaging and contents specified by the manufacturer in product literature (*i.e.*, the specific merchandise the refrigerated bottled or canned beverage vending machine is designed to vend).

In the March 2022 NOPR, DOE discussed its previous considerations of other standard products that could potentially be defined, including slimline cans, milk cartons, aseptic packs, pouches, and energy drinks. Having not received comment on this topic in response to the May 2021 RFI, DOE did not propose any changes in the March 2022 NOPR to the current test procedure standard packages of 12-ounce cans, 20-ounce

bottles, or the packaging and contents specified by the manufacturer in product literature, depending on the BVM vending capability. 87 FR 18936, 18942. DOE also did not receive any comment in response to the March 2022 NOPR on this topic.

Additionally, certain BVMs are marketed to vend both beverages and food but do not contain a solid partition that separates the shelves or compartments intended for refrigerated bottled or canned beverages from those intended for other merchandise. Section 2.2.1.4 of appendix B specifies that if the non-beverage shelves of these BVMs are not capable of vending 12-ounce cans or 20-ounce bottles, the standard product for testing is the packaging and contents specified by the manufacturer in product literature.

In the March 2022 NOPR, DOE discussed that for non-beverage shelves, manufacturers do not always specify the packaging and contents of the merchandise to be loaded. 87 FR 18936, 18942. Additionally, DOE discussed that measuring temperature at the center of mass of non-liquid merchandise packaging would provide unique challenges compared to liquid containers (*e.g.*, measuring the center of mass of a bag of chips). *Id.*

In the March 2022 NOPR, DOE tentatively determined that it could not identify a representative non-beverage test load because of the wide range of merchandise that could be loaded in non-beverage shelves. Additionally, DOE stated that it expects that measuring the temperatures of non-beverage standard packages would be difficult to do repeatably and reproducibly (*i.e.*, measuring the temperature in food packaging rather than in a liquid) and would increase test burden. *Id.* at 87 FR 18942-18943. To ensure that BVMs with non-beverage merchandising shelves are tested consistently and in a representative manner while limiting test burden, DOE proposed to specify in a new section 2.2.1.1 of appendix B that shelves within the refrigerated compartment that are only for non-beverage merchandise must not be loaded for testing. DOE stated that it expects that manufacturers may already use this approach for testing shelves that cannot

accommodate any beverage containers (*i.e.*, it is unclear how manufacturers currently test such BVMs, and DOE has not received any petitions for waiver regarding this issue). DOE also stated that it does not expect that this proposal would result in any cost impacts for BVM manufacturers. *Id.*

DOE requested comment on the proposal to specify that non-beverage merchandise shelves not be loaded for testing BVMs. *Id.* DOE also sought information on how such models are currently tested and on whether this proposal would impact current BVM ratings or test burden. *Id.*

NAMA stated that the packaging and contents of merchandise to be loaded in combination machines is the decision of the end user. (NAMA, No. 14, p. 3) NAMA agreed with DOE's assertion that it would be very difficult to design a uniform non-beverage food material for testing and supported DOE's proposal that the non-beverage areas be left empty for testing. *Id.*

In this final rule, DOE has determined that it cannot identify a representative non-beverage test load because of the wide range of merchandise that could be loaded in non-beverage shelves. Additionally, DOE has determined that, at this time, measuring the temperatures of non-beverage standard packages (*i.e.*, measuring the temperature in food packaging rather than in a liquid) would be difficult to do repeatably and reproducibly and would increase test burden. To ensure that BVMs with non-beverage merchandising shelves are tested consistently and in a representative manner while limiting test burden, DOE is specifying in a new section 2.2.1.1 of appendix B that shelves within the refrigerated compartment that are reserved only for non-beverage merchandise must not be loaded for testing, consistent with the proposal in the March 2022 NOPR. As discussed, DOE expects that manufacturers may already use this approach for testing shelves that cannot accommodate any beverage containers and that this amendment will not result in any cost impacts for BVM manufacturers. For shelves within the

refrigerated compartment that are for beverage merchandise, DOE is not making any changes in this final rule to the current standard package requirements.

Section 2.2.1.4 of appendix B requires that the standard product 12-ounce cans or 20-ounce bottles be filled with liquid with a density of $1.0 \text{ g/mL} \pm 0.1 \text{ g/mL}$ at 36 °F, whereas ANSI/ASHRAE Standard 32.1-2022 requires the beverage temperature test packages to be filled with a 33 percent propylene glycol and 67 percent water solution. ANSI/ASHRAE Standard 32.1-2022 does not specify whether these glycol and water percentages are based on weight or volume.

In the March 2022 NOPR, DOE noted the use of a propylene glycol solution in other test procedures, such as for testing commercial refrigeration equipment.¹² 87 FR 18936, 18943. Commercial freezers are by definition capable of operating below 32 °F (*see* 10 CFR 431.62) and are tested at a 0 °F integrated average temperature. *See* section 2.1 of 10 CFR part 431, subpart C, appendix B. While water would freeze at operating temperatures below 32 °F, the propylene glycol solution has a reduced freezing point and remains a liquid at the test temperatures. DOE discussed in the March 2022 NOPR that the potential for a phase change in the test solution introduces test variability, as solid and liquid water have different heat transfer properties, and if the phase change occurs during a test, the measured temperature during the phase change may not represent actual storage temperatures. *Id.*

In the March 2022 NOPR, DOE further stated that for BVMs, the target test condition of 36 °F is above the freezing point of water and other liquids likely to be used for testing BVMs. *Id.* As a result, DOE tentatively determined that specifying an alternative propylene glycol solution for testing BVMs would not be likely to reduce test variability, as is the case when testing other types of equipment at temperatures below the

¹² *See* 10 CFR part 431, subpart C, appendix B, which incorporates by reference ANSI/ASHRAE Standard 72–2005 (ANSI/ASHRAE 72–2005), “Method of Testing Commercial Refrigerators and Freezers.” Section 6.2.1 of ANSI/ASHRAE 72–2005 specifies the use of propylene glycol solution in test simulators.

freezing point of water. *Id.* Additionally, DOE tentatively determined that requiring the use of a propylene glycol solution would increase test burden compared to the existing test approach, which allows more flexibility and does not require the preparation of a test solution. *Id.* For these reasons, DOE tentatively determined to maintain the existing test procedure provisions regarding the specifications of the standard product. *Id.*

In response to the March 2022 NOPR, NAMA commented that other ASHRAE standards (*e.g.*, ASHRAE 72) use the percentage of propylene glycol and water by volume, not by weight, and that for consistency, the BVM test procedure should also use measurement by volume. (NAMA, No. 14, p. 4) NAMA also commented that specifying an alternative propylene glycol solution for testing BVMs is not likely to reduce test variability, as might be the case when testing materials at or below freezing, and stated that further clarification is not necessary. *Id.*

Based on consideration of these comments in response to the March 2022 NOPR, DOE has determined that specifying an alternative propylene glycol solution for testing BVMs is not likely to reduce test variability, as is the case when testing other types of equipment at temperatures at or below the freezing point of water, and would increase test burden compared to the existing test approach. Regarding NAMA's concern that the percentage of propylene glycol and water should be measured by volume, not weight, the test procedure as finalized in this document does not require the use of a propylene glycol mixture. In summary, for the reasons discussed here and in the March 2022 NOPR, DOE has determined to maintain the existing test procedure provisions regarding the specifications of the standard product as proposed in the March 2022 NOPR.

4. Lowest Application Product Temperature

Section 2.1.1 of appendix B requires that the IAT of the BVM be $36\text{ }^{\circ}\text{F} \pm 1\text{ }^{\circ}\text{F}$ over the test period. *See* table B.1 of appendix B. For BVMs only capable of operating

at temperatures higher than the specified IAT of $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$, section 2.1.3 of appendix B requires testing at the BVM's LAPT.

DOE's compliance certification database (CCD)¹³ lists all BVM models certified to DOE, including the LAPT used for rating each model, if applicable. Of the 148 individual models included in the CCD at the time of this analysis, 6 individual models (representing 2 basic models) from one manufacturer are rated at LAPTs ranging from 37.9°F to 38.5°F . Additional models had previously been certified to DOE (but are not included in the current CCD) as being rated at an LAPT below the $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ IAT range required in the DOE test procedure. For example, models from one manufacturer were previously rated at an IAT of 32°F , indicating that those BVMs could not operate at $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$.

In the March 2022 NOPR, DOE acknowledged that the current LAPT provisions result in some BVMs being tested at a higher temperature than those capable of maintaining the required test IAT. 87 FR 18936, 18943. However, for BVMs not capable of operating with temperatures of $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$, the LAPT test provisions are representative of the actual operation of those models. *Id.* Accordingly, the LAPT test provisions measure the energy use of those BVMs during a representative average use cycle or period of use as required by EPCA. (42 U.S.C. 6293(b)(3)) Additionally, any models tested and rated under the LAPT provisions are identified in DOE's CCD, along with the actual IAT maintained during testing for those models, so that such information is available to customers making purchasing decisions. *Id.*

Therefore, in the March 2022 NOPR, DOE tentatively determined to maintain the current LAPT provisions and proposed adding an additional provision for testing BVMs that are only capable of maintaining temperatures below the $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ range. 87 FR 18936, 18943. For these units, DOE proposed to test at the highest thermostat setting.

¹³ Available at www.regulations.doe.gov/certification-data.

Id. This would allow for testing the BVM under the setting closest to the required IAT.

Id. DOE proposed to amend the definition of “lowest application product temperature” in section 1.2 of appendix B as follows:

(a) For units that operate only at temperatures *above* the integrated average temperature specified in Table 1 of ANSI/ASHRAE Standard 32.1–2022: The lowest integrated average temperature a given basic model is capable of maintaining so as to comply with the temperature stabilization requirements specified in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022.

(b) For units that operate only at temperatures *below* the integrated average temperature specified in Table 1 of ANSI/ASHRAE Standard 32.1–2022: The highest integrated average temperature a given basic model is capable of maintaining so as to comply with the temperature stabilization requirements specified in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022. *Id.*

DOE requested comment on its initial determination to maintain the existing LAPT approach for units that operate only at temperatures above $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$. 87 FR 18936, 18944. DOE also requested comment on its proposal to require testing at the highest IAT a given basic model is capable of maintaining for units that are only capable of operating at temperatures below $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$. *Id.*

In response to the March 2022 NOPR, NAMA agreed with DOE’s proposal to maintain the current LAPT provisions and to require testing at the highest thermostat setting for BVMs that are only capable of maintaining temperatures below the 36°F range. (NAMA, No. 14, p. 4)

The Joint Commenters supported DOE’s proposed provisions for testing units only capable of operating below $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ at their highest thermostat setting, as well as DOE’s proposal to update the definition of LAPT to include this situation. Regarding DOE’s proposal to maintain the current test provisions for units only capable of operating

at temperatures above $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$, the Joint Commenters expressed concern that units tested at operating temperatures above the specified test temperature, thus consuming less energy (*i.e.*, by cooling to a higher temperature), can more easily comply with the energy conservation standards. The Joint Commenters encouraged DOE to consider defining a separate category for BVMs only capable of operating at temperatures above $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ and to establish a separate test temperature for such units. (Joint Commenters, No. 13, p. 1)

Regarding the concerns expressed by the Joint Commenters about units that operate only at temperatures above $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$, as discussed previously, the LAPT test provisions produce test results that are representative of the actual operation of such models. Accordingly, the LAPT test provisions measure the energy use of those BVMs during a representative average use cycle or period of use as required by EPCA. (42 U.S.C. 6293(b)(3)) DOE considers equipment class definitions and the applicability of any energy conservation standards to each defined class as part of separate energy conservation standards rulemakings.¹⁴ For the reasons discussed previously in this final rule and in the March 2022 NOPR, DOE is maintaining the existing LAPT approach for units that operate only at temperatures above $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$ and amending the definition of LAPT to more explicitly address such units, as proposed in the March 2022 NOPR.

For BVMs that are only capable of maintaining temperatures below $36^{\circ}\text{F} \pm 1^{\circ}\text{F}$, DOE is adopting the provisions proposed in the March 2022 NOPR to require testing such units at the highest IAT the unit is capable of maintaining (*i.e.*, the highest thermostat setting) and to amend the definition of LAPT to more explicitly address such units.

5. Payment Mechanisms

¹⁴ DOE is currently conducting an energy conservation standards rulemaking for BVMs. See docket number EERE-2020-BT-STD-0014 at www.regulations.gov.

Section 2.2.5.1 of appendix B requires testing BVMs with (1) no payment mechanism in place, (2) the payment mechanism in place but de-energized, or (3) the payment mechanism in place but set to the lowest energy consuming state if it cannot be de-energized. A default payment mechanism energy consumption value of 0.20 kilowatt-hours per day (kWh/day) is added to the measured energy consumption, according to section 2.3 of appendix B. In section 7.1.2.2. of ANSI/ASHRAE Standard 32.1-2022, payment mechanisms are required to be disconnected during testing.

In the July 2015 Final Rule, DOE determined that because payment mechanisms are variable and not always included in the machine at the time of sale, it is difficult to unambiguously specify a “representative” payment mechanism or device combination. 80 FR 45758, 45776. DOE concluded that conducting physical testing of BVMs with no payment mechanisms installed, as opposed to testing with payment mechanisms in place, is the most straightforward, repeatable, and unambiguous approach. *Id.* Because payment mechanisms are integral to the vending function of BVMs, DOE established the 0.20 kWh/day value based on a weighted average energy consumption of 25 different payment mechanisms available at the time of the July 2015 Final Rule, which included 11 coin mechanisms, 11 bill validators, and 3 credit card readers. 80 FR 45758, 45777.

In the March 2022 NOPR, based on a survey of units currently available on the market, DOE observed that coin and bill payment mechanisms are typically included with BVMs as sold or shipped, but that credit card readers are typically sold as an optional feature and are sold separately from BVMs. 87 FR 18936, 18944. DOE also discussed in the March 2022 NOPR a lack of data regarding the relative use of credit card readers as compared to coin and bill payment mechanisms. *Id.*

As presented in the March 2022 NOPR, DOE conducted a review of currently available payment mechanisms to determine whether the previously derived 0.20 kWh/day default payment mechanism energy consumption is appropriate. 87 FR 18936,

18944. DOE reviewed manufacturer specifications for 3 coin changers, more than 30 bill validators, and 2 credit card readers. *Id.* A summary of the calculated daily energy consumptions for each payment mechanism type based on the manufacturer specifications is presented in Table III.I.

Table III.I Payment Mechanism Energy Consumption Summary as Presented in the March 2022 NOPR

Payment Mechanism Type	Average Calculated Daily Energy Consumption (<i>kWh/day</i>)	Range of Calculated Daily Energy Consumption (<i>kWh/day</i>)
Coin Changer	0.07	0.01 to 0.12
Bill Validator	0.11	0.04 to 0.17
Credit Card Reader	0.10	0.07 to 0.12

In the March 2022 NOPR, DOE tentatively determined that requiring a payment mechanism included with a BVM as shipped (*i.e.*, the coin and bill payment mechanism) to be energized during testing would provide a more representative measure of energy use compared to the current default value specified in the test procedure. 87 FR 18936, 18944. DOE proposed to amend the test procedure to require that if a BVM is shipped with coin and/or bill payment mechanisms in place, the payment mechanisms shall be energized during testing, but not until the compliance date of any amended energy conservation standards. *Id.* Because credit card readers are more likely to be optional features or sold separately, DOE proposed to maintain the existing approach for testing in which (1) credit card payment mechanisms would be disconnected or de-energized if possible or (2) credit card payment mechanisms would remain in place but set to the lowest energy consuming state if they cannot be de-energized. 87 FR 18936, 18944-18945. To account for the possibility that a BVM may be shipped with no payment mechanism in place, DOE proposed to maintain the 0.20 kWh/day energy use adder to

represent the energy consumption of a payment mechanism during representative use. 87 FR 18936, 18945.

DOE requested comment on its proposal to require testing with coin and bill payment mechanisms energized if they are included in the BVM as shipped. 87 FR 18936, 18945. DOE also requested comment on whether this approach would result in any additional test burden. *Id.* DOE additionally requested comment on its proposal to require that any credit card payment mechanisms for testing be disconnected or de-energized, if possible, or in place but set to the lowest energy consuming state if they cannot be de-energized. *Id.* DOE further requested information on the continued use of the 0.20 kWh/day energy use adder for BVMs shipped with no coin or bill payment mechanisms in place. *Id.* DOE also requested comment on the proposal not to require the use of these amendments until the compliance date of any future amended energy conservation standards for BVMs. *Id.*

The Joint Commenters supported DOE's proposed provisions relating to bill and coin payment mechanisms but expressed concern that the energy consumed by credit card readers would not be captured through direct testing nor accurately captured through the application of the 0.2 kWh power adder. (Joint Commenters, No. 13, p. 1-2) The Joint Commenters encouraged DOE to extend its proposal to all types of payment mechanisms shipped with BVMs and require credit card readers to be energized during testing if they are sold with the models. *Id.*

NAMA commented that its survey showed the percentage of machines shipped with payment systems ranged from 5 to 98 percent by manufacturer. (NAMA, No. 14, p. 4) NAMA added that some manufacturers ship 80 to 98 percent of units with a payment system, while other manufacturers ship far fewer units with payment systems, instead allowing the customer to add a payment system later. *Id.* NAMA further commented that there can be multiple coin, bill, and credit card readers for each model of each

machine. (NAMA, No. 14, p. 5) NAMA added that for machines shipped with a payment system, DOE's proposal would require creating a matrix of multiple machine types to be tested with multiple payment types by multiple manufacturers of the payment systems.

Id. NAMA also commented that new technologies are regularly entering the market, and that many BVMs must incorporate cell phone payment, credit card chip pass-by systems, and telemetry systems. *Id.* NAMA added that BVM manufacturers often receive a new payment system from a customer shortly before production and asserted that DOE's proposal would require production of BVMs to be put on hold until energy testing of such new payment systems is completed. *Id.*

NAMA disagreed with DOE's estimate of the cost of testing for different payment mechanisms. (NAMA, No. 14, p. 9) NAMA stated that the cost is much higher than \$8,300 per basic model. *Id.* In addition, NAMA noted that each time a manufacturer seeks to make a change that in any way affects the energy use of the machine, it would necessitate the entire matrix of tests with every possible combination of payment mechanisms. *Id.* Lastly, NAMA added that substantive changes to the major energy-using components of a BVM (*e.g.*, new compressor, new condenser, new evaporator) necessitate a complete review by the safety certification organization; that the cost of such a retest is far more than DOE's estimate and could take 3 months or more; and that DOE did not include safety recertification in its estimated cost of testing. *Id.*

NAMA commented that testing multiple combinations would be onerous, and stated that while NAMA would agree using an automatic 0.20 kWh/day factor may not be the most accurate in all cases, the current use of this factor is better than requiring hundreds of hours of laboratory testing for the sake of a fraction of a kWh/day difference. (NAMA, No. 14, p. 5) In response to DOE's statement that manufacturers would not be required to retest or recertify BVMs because of the proposed payment mechanism approach until the new standard is effective, NAMA asserted that manufacturers would

have to engage in considerable testing before and after the new test procedure becomes required. (NAMA, No. 14, p. 6) NAMA commented that all of the additional testing described in their comment seems unnecessary with regard to a difference in energy use of 0.003 kWh/day. *Id.*

DOE has further considered its approach regarding payment mechanisms based on these comments and additional analysis and review of the data and information presented in the March 2022 NOPR. The available information demonstrates that a wide (and growing) variety of payment systems is currently available on the market; the most common scenario is for the payment mechanism to be specified (and in some cases, provided) by the customer; and the customer may decide whether to have the payment mechanism installed by the BVM manufacturer at the time of sale. DOE has further analyzed the energy use data presented in the March 2022 NOPR and has concluded that the difference in energy use between types of payment mechanisms (*e.g.*, generally less than 0.1 kWh/day) is a small fraction of the measured daily energy consumption of the BVM as currently tested (*e.g.*, ranging from 2.2 to 4.9 kWh/day for models currently listed in DOE's CCD). DOE also notes that the combined average calculated daily energy use of a coin changer and bill validator as presented in Table III.I (*i.e.*, 0.18 kWh/day)—which represents a typical combination of payment mechanisms available on BVMs—closely matches the default adder (0.20 kWh/day). DOE has also further considered the additional test burden that could result from requiring a payment mechanism that is included with the BVM as shipped to be energized during testing, as suggested by commenters.

Based on these considerations, DOE has determined that requiring a payment mechanism to be energized during testing if it is included with a BVM as shipped may not necessarily provide a more representative measure of energy use compared to the

current test method, and that any improvement in representativeness resulting from such a requirement would be outweighed by the additional test burden that may be required, as described in stakeholder comments. Therefore, in this final rule, DOE is not amending the test provisions with regard to payment mechanisms as it proposed to do in the March 2022 NOPR. Instead, DOE has determined to maintain the current test provisions, which specify a default 0.2 kWh/day adder.

6. Low Power Modes

Appendix B incorporates definitions and test requirements for two types of low power modes:¹⁵ accessory low power mode and refrigeration low power mode. Section 7.2.2.6.2 of ANSI/ASHRAE Standard 32.1-2022 requires that low power modes not be allowed to operate during testing.

In the July 2015 Final Rule, DOE acknowledged that the two types of low power modes incorporated into the test procedure may not address all forms of low power modes available in the BVM market. 80 FR 45758, 45786. DOE identified “learning-based” energy management controls that use historical sales and traffic data to predict times of high and low traffic; however, DOE did not propose a test procedure for such controls, determining that it would be difficult to develop a repeatable test procedure to evaluate the energy savings of such controls during a 24-hour test in a laboratory. *Id.*

In the March 2022 NOPR, DOE described its expectation that the impacts of any learning-based controls would vary based on specific field installation and usage scenarios. 87 FR 18936, 18945. DOE stated that it was not aware of, and interested

¹⁵ “Low power mode” means a state in which a BVM’s lighting, refrigeration, and/or other energy-using systems are automatically adjusted (without user intervention) such that they consume less energy than they consume in an active vending environment. See section 1.2 of appendix B.

parties had not previously provided, any data that could be used to determine the impacts of learning-based controls on energy use (*e.g.*, by increasing the amount of time spent in either accessory low power mode or refrigeration low power mode rather than vending mode). *Id.* DOE also tentatively maintained its prior determination that it would be difficult to develop a repeatable and reproducible test procedure to evaluate the energy savings of such controls during a 24-hour test in a laboratory. *Id.* For these reasons, DOE did not propose to account for “learning-based” controls in the test procedure. *Id.* DOE tentatively determined to continue accounting for operation in accessory low power mode and refrigeration low power mode, as described in the following sections. *Id.*

NAMA commented that it disagrees with a comment submitted by the Appliance Standards Awareness Project (ASAP) and Natural Resources Defense Council (NRDC) in response to the May 2021 RFI that asserted that maintaining the provisions for low power mode testing, which are not included in ANSI/ASHRAE 32.1-2017, would incentivize manufacturers to incorporate more energy management controls to reduce energy consumption. (NAMA, No. 13, pp. 2-3; *see also* ASAP and NRDC, No. 4, p.1) NAMA stated that its members are constantly improving the energy efficiency of BVMs, and manufacturers will use energy management controls when the improvement to efficiency and the cost are appropriate. *Id.*

NAMA also stated that it is not prepared to comment on the energy benefits of “learning-based” energy management controls. (NAMA, No. 14, p. 6) NAMA commented that this is a new and changing field and suggested that DOE not engage in this investigation at this time, as the technologies are still unknown. *Id.* NAMA added that the impacts of any learning-based controls would vary greatly by the specific field installation and usage scenarios, many of which are set by the end user, not the BVM manufacturer. *Id.*

At this time, DOE remains unaware of, nor have interested parties provided, any data that could be used to determine the impacts of learning-based controls on energy use (e.g., by increasing the amount of time spent in either accessory low power mode or refrigeration low power mode rather than vending mode). DOE also maintains its prior determination that it would be difficult to develop a repeatable and reproducible test procedure to evaluate the energy savings of such controls during a 24-hour test in a laboratory. For these reasons, DOE has determined not to amend the test procedure to account for “learning-based” controls, consistent with the March 2022 NOPR. DOE has determined to continue accounting for operation in accessory low power mode and refrigeration low power mode in the test procedure, as described in the following sections.

a. Accessory Low Power Mode

Section 1.2 of appendix B defines accessory low power mode as a state in which a BVM’s lighting and/or other energy-using systems are in low power mode, but not a refrigeration low power mode. Functions that may constitute an accessory low power mode may include, for example, dimming or turning off lights, while not including adjustment of the refrigeration system to elevate the temperature of the refrigerated compartment(s). Section 2.2.4 of appendix B states that accessory low power mode may be engaged for the final 6 hours of the 24-hour test period and requires that the BVM be operated in the lowest energy-consuming lighting and control settings for testing this mode. Section 2.2.4 also requires that any automatic activation of refrigeration low power modes be prevented during the accessory low power mode test period.

The 24-hour test procedure starts after a BVM achieves stabilization as determined in vending mode. *See* section 2.1.1.1 of appendix B. The test period ends with 6 hours of operation in accessory low power mode, a different operating state than at the start. Although the refrigeration system and cabinet temperatures would likely not

change in accessory low power mode (because this mode does not include adjustment of the refrigeration system to elevate the temperature of the refrigerated compartment(s)), a transient recovery period may be required for a BVM to return to stable operation in vending mode after 6 hours operating in accessory low power mode. If such a recovery period exists, testing the accessory low power mode during the middle of the 24-hour test period may be more representative by capturing any transition periods between operating modes.

In the March 2022 NOPR, DOE discussed its observations from testing that measured temperatures remain unchanged during operation in vending mode and accessory low power mode. *Id.* DOE also explained that the existing test approach limits test burden by requiring only one operating mode transition during the 24-hour test period. *Id.* Moving the accessory low power mode operation to a period other than at the end of the 24-hour test period may require technicians to provide additional input to the unit during the test (*i.e.*, once to enter accessory low power mode and again to reenter vending mode), depending on the BVM's controls. *Id.* For these reasons, DOE did not propose in the March 2022 NOPR any changes to the current test procedure approach of requiring accessory low power mode to be tested at the end of the 24-hour test period. *Id.*

In the March 2022 NOPR, DOE acknowledged in response to commenters that BVMs may be used in a variety of locations and that the actual duration of accessory low power mode use will vary based on installation location. 87 FR 18936, 18946. In the NOPR preceding the July 2015 Final Rule, DOE stated that the 6-hour duration was selected as a representative length of time for the low power mode test period based on the fact it is intended to represent off hours between periods of vending when the facility may be closed or have low occupancy. 79 FR 46908, 46926. While DOE recognized that there exists a range of types of low power mode controls and time periods for which

these controls are enabled, DOE determined that a timeframe of 6 hours was a reasonable representation of average field use. *Id.*

In the March 2022 NOPR, DOE stated it was not aware of data indicating that durations other than the currently defined 6 hours would be more representative of typical BVM operation in accessory low power mode. 87 FR 18936, 18946. The intent of the accessory low power mode test period remains unchanged from the July 2015 Final Rule approach (*i.e.*, representing off hours between periods of vending when the facility may be closed or have low occupancy). *Id.* Given the lack of any data supporting a change to this approach, DOE did not propose any changes to the 6-hour duration for accessory low power mode testing. *Id.*

NAMA commented that it agrees with DOE's conclusion not to change the accessory low power mode testing at this time. (NAMA, No. 14, p. 6) NAMA also agreed with DOE that BVMs may be used in a variety of locations and the actual duration of the accessory low power mode will be based on the installation location as well as the choice of the customer/user. *Id.* NAMA commented that the BVM manufacturer may not have control over either this period or the environment, and these are at the discretion of the customer. *Id.* Finally, NAMA commented that the current method works and that NAMA believes it is better to establish a clear, reasonable, and reproducible method than it is to measure something so highly variable. *Id.*

In consideration of these comments, and lacking any new information that would contradict DOE's prior considerations of this issue, DOE has determined to maintain the existing accessory low power mode approach, consistent with the March 2022 NOPR.

b. Refrigeration Low Power Mode

Section 1.2 of appendix B defines refrigeration low power mode as a state in which a BVM's refrigeration system is in low power mode because of elevation of the temperature of the refrigerated compartment(s). Section 2.3.2.1 of appendix B includes

provisions for confirming the presence of a refrigeration low power mode, either through an increase in average next-to-vend beverage temperature or lack of compressor operation. Unlike accessory low power mode, appendix B does not include a direct test of refrigeration low power mode. Instead, BVMs with refrigeration low power mode receive a 3-percent reduction in DEC as measured. *See* section 2.3.2 of appendix B.

In the July 2015 Final Rule, DOE determined that a 3-percent energy reduction was more appropriate than a physical test of refrigeration low power mode because refrigeration low power modes are extremely variable in their control strategies and operation and may require instructions from the manufacturer to accommodate specific provisions of a physical test. 80 FR 45758, 45785. DOE stated that a physical test would reduce consistency and repeatability and would make the method impractical to implement. *Id.*

DOE established the 3-percent credit for refrigeration low power mode by testing several BVMs with this mode. DOE noted in the July 2015 Final Rule that this value is an average that is representative of the common types of refrigeration low power modes available in the marketplace. 80 FR 45758, 45786.

In the March 2022 NOPR, DOE did not propose any changes to the current refrigeration low power mode and validation test method. 87 FR 18936, 18946. DOE also tentatively determined that the challenges of implementing a refrigeration low power mode test would remain the same as those considered in the July 2015 Final Rule. *Id.* at 87 FR 18936, 18947. Specifically, DOE observed that the implementation of refrigeration low power mode would depend on the specific control parameters entered by the user or installer regarding duration, operating temperatures, and operation of the refrigeration system. *Id.* Additionally, establishing a consistent, repeatable test (*i.e.*, measuring refrigeration low power mode operation over a defined duration from initiation of the low power mode until temperature recovery to the specified test

temperature) may require specific instructions from the manufacturer to modify the controls in such a way as to accommodate the specific requirements of a physical test. *Id.* Testing on a consistent basis would also likely require an iterative process to identify the appropriate test settings. *Id.* Due to the difficulty of accounting for the wide variety of refrigeration low power modes in a consistent, fair, and reasonable manner, as well as the potential burden of any such test approach, DOE did not propose any changes to the current calculation approach to account for operation in refrigeration low power mode. *Id.*

In the March 2022 NOPR, DOE also did not propose any changes to the 3-percent credit as the energy reduction associated with refrigeration low power mode. 87 FR 18936, 18947. DOE acknowledged that the actual energy impact of refrigeration low power mode would vary depending on the user-specified control parameters for that mode, including duration and temperature settings or refrigeration system control. *Id.* The investigative testing used to determine the 3-percent credit assumed 6 hours of operation in refrigeration low power mode, including the time needed for temperature recovery. 79 FR 46908, 46925-46926. DOE did not propose any changes to the 6-hour test period for accessory low power mode, and therefore is maintaining the estimate of refrigeration low power mode impact based on that same duration. *Id.*

In the March 2022 NOPR, DOE requested comment on its initial determination to maintain the existing calculation approach to account for operation in refrigeration low power mode. 87 FR 18936, 18947. DOE continued to seek information and data on whether the assumed operating period (6 hours) and corresponding energy consumption impact (3 percent) are appropriate for BVMs operating in refrigeration low power mode. *Id.*

NAMA commented that it did not believe any amendments were necessary for the definition of refrigeration low power mode. (NAMA, No. 14, p. 7) NAMA added that it

was not aware of any other refrigeration low power mode that cannot meet the definition or validate the test method. *Id.*

NAMA also commented in response to DOE's questions of whether a physical test to account for low power mode is feasible and what burden would be associated, stating it did not believe a physical test was necessary, and any such test would be a significant burden to manufacturers. (NAMA, No. 14, p. 7) NAMA stated that there are many such low power modes for refrigeration based on end customer use, not necessarily by the BVM manufacturer. *Id.* NAMA agreed with DOE that the challenges of implementing a refrigeration low power mode test remain the same as in 2015. *Id.*

NAMA further commented that manufacturers do not own the equipment in the field and often have no contact with the machines once placed in the field. NAMA stated that from what little information it has, the 3-percent credit and the 6-hour low power mode test period are reasonable, approximate the current status, and are as accurate as possible at this time. (NAMA, No. 14, p. 7) NAMA also noted that some of the commenters stated that the 3-percent credit might be inhibiting to technology, and that NAMA members do not agree with this assessment.¹⁶ *Id.*

In consideration of these comments, and lacking any new information that would contradict DOE's prior considerations of this issue, DOE is maintaining the existing test procedure provisions and 3-percent energy credit for refrigeration low power mode, consistent with the March 2022 NOPR.

7. Reloading and Recovery Periods

The existing DOE test procedure considers BVM performance only during stable operation (including any operation in accessory low power mode). During typical use,

¹⁶ NAMA did not specify the commenters referenced, but DOE expects that NAMA is referencing the comment from ASAP and NRDC that stated that the 3-percent credit may be inhibiting further improvements by failing to differentiate between refrigeration low power mode control strategies. (ASAP and NRDC, No. 4, p. 1)

BVMs are regularly opened and restocked with warmer beverages. DOE discussed in the March 2022 NOPR that accounting for BVM energy use during restocking periods and the subsequent product temperature recovery periods may better represent the actual energy use of BVMs during normal operation. 87 FR 18936, 18947.

As stated in section III.B of this document, ANSI/ASHRAE Standard 32.1-2022 provides an additional recovery test to determine the temperature recovery time of the BVM when loaded with product at a certain temperature, whereas appendix B contains no such test. This recovery test does not include a measurement of the corresponding energy consumption. Table 2 in ANSI/ASHRAE Standard 32.1-2022 specifies the reloaded sealed beverage temperature, 90 °F, and the final, instantaneous average next-to-vend beverage temperature, 40 °F, for the recovery test. Additionally, Table 4 in ANSI/ASHRAE Standard 32.1-2022 lists the door-open durations, between 10 and 20 minutes, required during the recovery test while reloading the BVM.

DOE also discussed in the March 2022 NOPR that based on typical operating descriptions provided in vending industry websites,¹⁷ DOE expected that BVM restocking events are relatively infrequent, on the order of once per week, while the remainder of BVM operating time is spent in stable operation. *Id.* DOE tentatively determined that the current test procedure based on stable operation measures energy consumption during a representative average use cycle or period of use and therefore did not propose any additional testing to account for reloading events. *Id.*

In response to the March 2022 NOPR, NAMA commented that the current appendix B does not contain a temperature recovery period. (NAMA, No. 14, pp. 7-8) NAMA stated that while machine manufacturers do not have daily contact with machines once in the field, from what NAMA can tell BVM restocking does not represent

¹⁷ See www.vendnetusa.com/blogs/news/how-often-should-you-restock-your-vending-machines?_pos=1&_sid=bc71729a1&_ss=r and www.vendnm.com/often-restock-inspect-vending-machine/, both of which refer to restocking once per week.

significant change in yearly energy consumption. *Id.* NAMA agreed with DOE's assertion that restocking appears to be relatively infrequent, on the order of once a week. *Id.* NAMA also stated that an additional test for these characteristics is not needed nor reasonable. *Id.*

The Joint Commenters encouraged DOE to investigate units that may have frequent door openings and to consider test procedure amendments for this type of product. (Joint Commenters, No. 13, p. 2) The Joint Commenters specifically described what appears to be a reach-in style unit on the market that is designed so that users open the door to reach in and obtain the beverage product, instead of the product being vended from a chute.¹⁸ *Id.* The Joint Commenters stated that with such a design, the current and proposed test procedures would not capture door openings, likely underestimating the energy consumption. *Id.*

With regard to the specific reach-in style unit described by the Joint Commenters, DOE has determined that while this unit appears to contain a payment mechanism, the design and function of the unit appears to meet the definition of a commercial refrigerator, freezer, and refrigerator freezer at 10 CFR 431.62 and does not meet the definition of a refrigerated bottled or canned beverage vending machine at 10 CFR 431.292.

In consideration of these comments and lacking any new information that would contradict DOE's prior considerations of this issue, DOE has determined to maintain the current test procedure without any reloading or recovery period requirements, consistent with the March 2022 NOPR.

¹⁸ See www.buyvending.com/shop/new-vending-machines/drink-vending-machines/piranha-g525-drink-vending-machine-cashless/.

8. Refrigerant Leak Mitigation Controls

The current BVM test procedure requires that, unless specified otherwise, all standard components that would be used during normal operation of the basic model in the field and are necessary to provide sufficient functionality for cooling and vending products in field installations (*i.e.*, product inventory, temperature management, product merchandising (including, *e.g.*, lighting or signage), product selection, and product transport and delivery) shall be in place during testing and shall be set to the maximum energy-consuming setting if manually adjustable. *See* section 2.2.5 of appendix B. Appendix B further requires that components not necessary for the inventory, temperature management, product merchandising (*e.g.*, lighting or signage), product selection, and product transport and delivery shall be de-energized, or if they cannot be de-energized without preventing the operation of the machine, then they shall be placed in the lowest energy consuming state. *Id.* Any components with controls that are permanently operational and cannot be adjusted by the machine operator shall be operated in their normal setting. *Id.*

Leak mitigation controls are a component that may be offered on BVMs, particularly in conjunction with flammable refrigerants. In a final rule published April 10, 2015, the Environmental Protection Agency listed propane (R-290), isobutane (R-600a), and the hydrocarbon blend R-441A as acceptable refrigerants for use in BVMs, subject to a 150-gram charge limit per refrigeration circuit and other safety measures to address flammability. 80 FR 19454, 19491. Due to the flammability of these refrigerants, BVMs using hydrocarbon refrigerants may need to implement additional controls and components to mitigate the risk of ignition from any potential refrigerant leaks. The need for such controls also may vary depending on the intended installation location for BVMs.

To the extent that leak mitigation controls on a particular BVM are a user-controllable accessory (*i.e.*, if they can be turned off), such a BVM would be able to provide product inventory, temperature management, product merchandising, product selection, and product transport and delivery without the leak mitigation controls functioning, in which case such controls would be de-energized for testing pursuant to the requirements of section 2.2.5 of appendix B. However, if the leak mitigation controls are permanently operational and cannot be adjusted by the user, section 2.2.5 of appendix B requires that such controls be operated in their normal setting during testing.

DOE tentatively determined in the March 2022 NOPR that although section 2.2.5 of appendix B currently addresses the use of refrigerant leak mitigation controls during testing, further specification may help ensure reproducible testing. 87 FR 18936, 18948. DOE therefore proposed to amend the test procedure to provide specific instructions regarding the use of refrigerant leak mitigation controls consistent with the current requirements in appendix B. *Id.* Specifically, DOE proposed in the newly added section 2.2.5.11 of appendix B that if the use of refrigerant leak mitigation controls is a user-controlled function (*e.g.*, if the use of the controls are optional and intended only for specific installations), the controls would be de-energized or in their lowest energy consuming state during testing. *Id.* If refrigerant leak mitigation controls are not user controlled and are always operational, DOE proposed that the controls would be operational for testing. *Id.*

In the March 2022 NOPR, DOE acknowledged that the investigative work regarding refrigerant leak mitigation is ongoing; however, DOE stated that if refrigerant leak mitigation controls always operate and cannot be de-energized by the user, accounting for the energy use of such controls would ensure that the DOE test procedure

measures energy consumption during a representative average use cycle or period of use as required by EPCA. 42 U.S.C. 6293(b)(3); 87 FR 18936, 18948.

As discussed in the March 2022 NOPR, the proposed instructions regarding refrigerant leak mitigation controls are consistent with the current requirements in section 2.2.5 of appendix B, therefore, DOE did not expect the proposed amendments to affect current BVM ratings or result in any additional testing costs. 87 FR 18936, 18948. DOE requested comment on the proposed instructions regarding refrigerant leak mitigation control settings for BVM testing. *Id.* Specifically, DOE requested information regarding how such controls are currently or expected to be implemented in BVMs, including whether the controls can be controlled by the user. *Id.*

In the NOPR public meeting, AHRI described the complexity of refrigerant transitions with respect to timing and stated that it would be helpful for DOE to coordinate with other agencies on this matter. (AHRI, Public Meeting Transcript, No. 12, pp. 18-20) AHRI specifically mentioned the need for building codes to be in place in order to use new refrigerants (*e.g.*, R-290). *Id.*

In response to the March 2022 NOPR, NAMA commented that its members have been working for more than 5 years to adopt new lower global warming potential (GWP) refrigerants. (NAMA, No. 14, p. 8) NAMA further commented that in 2021, DOE requested information on additional equipment or controls that manufacturers might need to mitigate a leak situation, and that in 2021 NAMA was engaged with Oak Ridge National Laboratory and DOE in a Cooperative Research and Development Agreement (CRADA). (NAMA, No. 14, p. 8) NAMA noted that the COVID-19 pandemic caused many delays in the CRADA, resulting in delayed and reduced testing. *Id.* NAMA

commented that an interim report issued at the end of 2021 showed that an increase in ventilation is helpful in reducing the concentration should a leak in the refrigerant system occur. *Id.* NAMA commented that because the new refrigerants are ASHRAE 34 Class A-3 and considered flammable, BVM manufacturers must explore and take steps to reduce the risk of a leak from the refrigerant system. *Id.* NAMA commented that this type of equipment might need to be energized in some circumstances to move air all the time, in addition to controls that could energize the ventilation equipment when a leak is discovered. *Id.* NAMA stated that a specific, accurate, reliable refrigerant sensor is not yet available; therefore, NAMA is continuing the CRADA in 2022 to consider other means of sensing a leak. *Id.*

NAMA further commented that the use of additional ventilation, whether all the time or in a leak scenario, is important for product and consumer safety, although at this time NAMA does not know exactly what these mechanisms might be. (NAMA, No. 14, p. 8) NAMA stated that DOE should not impede technology options by assessing an “energy penalty” to BVM manufacturers when the manufacturers deem it necessary to use such safety components. *Id.* NAMA urged DOE not to include the energy use of these safety measures, particularly not before results of the current CRADA are available. *Id.* NAMA stated that it is highly unlikely that leak mitigation components would be customer controlled if they are used. *Id.* NAMA stated that at this time, it is too early to predict what leak mitigation controls might be used. *Id.*

NAMA further stated that it understands DOE and other branches of the U.S. Government encourage the use of low GWP refrigerants and asked that all measures under the DOE test procedure not increase the time to adopt these refrigerants. *Id.*

In response to the March 2022 NOPR, the Joint Commenters supported DOE's proposed specifications for refrigerant leak mitigation controls, specifically commenting that if the refrigerant leak mitigation controls are always on, they should be energized and operational for testing. (Joint Commenters, No. 13, p. 2)

In consideration of the feedback provided by commenters, DOE has determined to amend the test procedure to include additional instructions for refrigerant leak mitigation controls; however, DOE has determined to modify the test procedure provisions as originally proposed in the March 2022 NOPR to better address commenters' concerns that refrigerant leak mitigation controls are not a consumer-controllable function. Rather, comments from stakeholders suggest that refrigerant leak mitigation controls, if included in a BVM, would be integral to the function of the unit.

Therefore, DOE is modifying the proposed provisions of section 2.2.5.11 of appendix B to more accurately differentiate between refrigerant leak mitigation controls that are independent from the refrigeration or vending performance of the BVM (rather than describing such controls as a user-controlled function, as proposed in the March 2022 NOPR) from controls that are integrated into the BVM such that they cannot be de-energized without disabling the refrigeration or vending functions of the BVM or modifying the circuitry (rather than describing such controls as not user-controlled and always operational, as proposed in the March 2022 NOPR). The finalized language of section 2.2.5.11 specifies that for refrigerant leak mitigation controls that are independent from the refrigeration or vending performance of the BVM, such controls must be disconnected, disabled, or otherwise de-energized for the duration of testing. For refrigerant leak mitigation controls that are integrated into the BVM cabinet such that they cannot be de-energized without disabling the refrigeration or vending functions of

the BVM or modifying the circuitry, such controls must be placed in an external accessory standby mode, if available, or their lowest energy-consuming state.

DOE notes that this provision is similar to DOE's current test procedure provisions for external lighting and displays. Consistent with the March 2022 NOPR, DOE does not expect this amendment to affect current BVM ratings or result in any additional testing costs.

9. Connected Functions

The current DOE test procedure for BVMs does not include specific test requirements regarding connected or smart features, although section 2.2.5 of appendix B provides instructions regarding accessories. Section 2.2.5 of appendix B generally requires all components necessary to provide sufficient functionality for cooling and vending products in field installations (*i.e.*, product inventory, temperature management, product merchandising (including, *e.g.*, lighting or signage), product selection, and product transport and delivery) to be in place during testing and set to the maximum energy consuming setting if manually adjustable. Other components not necessary for such functionality are de-energized or set to their lowest energy-consuming state.

In the March 2022 NOPR, DOE discussed that based on a review of BVMs available on the market, the types of connected functions identified by commenters in response to the May 2021 RFI did not appear to be common. 87 FR 18936, 18948-18949. Additionally, DOE lacked information on how frequently connected functions would be used on BVMs. 87 FR 18936, 18949. Without such data, DOE had no information to suggest that the current testing approach would produce results that are unrepresentative of an average use cycle or period of use. *Id.* DOE, therefore, did not propose any changes to the current test procedure approach in section 2.2.5 of appendix B as applicable to connected functions. *Id.* As described, the current approach requires

testing with connected functions energized if they are necessary to provide sufficient functionality for cooling and vending products in field installations. Connected functions that are not necessary to provide sufficient functionality for cooling and vending products in field installations are de-energized or placed in the lowest energy-consuming state.

In the March 2022 NOPR, DOE requested comment on its tentative determination to maintain the existing test procedure approach in section 2.2.5 of appendix B as applicable to connected functions. 87 FR 18936, 18949. DOE continued to request information and data on the prevalence of connected functions, the BVM functions associated with them, how often they are used, and their corresponding energy use impacts. *Id.*

NAMA commented that it does not have additional information on the issue of connected functions and the energy impact of these functions at this time. (NAMA, No. 14, pp. 8-9) NAMA noted that its industry is in the early phase of investigating these functions and hopes to have additional information in future years. *Id.*

Lacking any additional information that would contradict DOE's prior considerations of this issue, DOE has determined to maintain the current test procedure approach in section 2.2.5 of appendix B as applicable to connected functions, consistent with the March 2022 NOPR.

10. Condenser Conditions

In the March 2022 NOPR, DOE acknowledged that the energy consumption of BVMs can change over the lifetime of the equipment due to lack of maintenance or other factors; however, the DOE test procedure considers the performance of new BVMs without considering any potential long-term performance of the unit. 87 FR 18936, 18949. Regarding the specific topic of condenser coil fouling, DOE stated that the end

user is responsible for properly maintaining the BVM, including any condenser cleaning. *Id.* Accordingly, DOE did not propose to amend its test procedure to account for operation with clogged condensers. *Id.*

While DOE does not account for lifetime energy consumption in its BVM test procedure, it does consider energy consumption over the lifetime of the equipment in the analysis conducted in support of developing potential amended energy conservation standards for BVMs. In such an analysis, DOE may apply adjustment factors to consider performance degradation over time.

In the March 2022 NOPR, DOE requested any additional information and data on how BVM energy consumption may change over the lifetime of the equipment. 87 FR 18936, 18949. DOE also requested comment on whether any performance degradation occurs consistently for all BVMs, or whether the impacts vary depending on equipment type or specific equipment designs. *Id.*

NAMA referenced comments submitted in response to the May 2021 RFI by CoilPod, which questioned whether it would be possible for the test procedure to account for the lack of coil cleanings by BVM users. (NAMA, No. 14, p. 9; *see also* CoilPod, No. 3, p. 1) NAMA reiterated that BVM manufacturers conduct testing for compliance with DOE standards, but they do not own the machines once they are placed in a retail landscape and have no ability to control whether cleaning is accomplished or not. *Id.* NAMA stated that even if the machine came back to the manufacturer for repair, energy testing would not be performed. *Id.* NAMA commented that it is not aware of other electrical appliances covered by DOE's standards program that need to account for changes in energy use if maintenance is not performed. *Id.*

DOE has determined to maintain the current test procedure and not amend the test procedure to account for the performance of the condenser over the lifetime of a BVM, consistent with the March 2022 NOPR.

11. Removal of Obsolete Provisions

As discussed in section I.B, appendix B is required for testing BVMs manufactured on or after January 8, 2019. As such, appendix A is now obsolete for new units being manufactured. Therefore, in the March 2022 NOPR, DOE proposed to remove appendix A. 87 FR 18936, 18949. DOE did not propose to redesignate appendix B as appendix A in order to avoid confusion regarding the appropriate version of the test procedure required for use. *Id.*

DOE did not receive comments in response to this topic and has determined to remove appendix A as proposed in the March 2022 NOPR. DOE has determined not to redesignate appendix B as appendix A in order to avoid confusion regarding the appropriate version of the test procedure required for use.

Additionally, the introductory note to appendix B currently explains when manufacturers are required to use either appendix A or B for compliance with energy conservation standards and representations of energy use. DOE proposed to amend the introductory note to remove the obsolete instructions and to instead provide clarifying language regarding application of the payment mechanism provisions, as discussed in section III.C.5 of this document. 87 FR 18936, 18949.

DOE did not directly receive comments on this topic. However, as discussed in section III.C.5 of this final rule, DOE is not amending the current provisions regarding the payment mechanism adder. Therefore, DOE is not including clarifying language in

the revised appendix note regarding application of the payment mechanism provisions as proposed in the March 2022 NOPR.

D. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

In the March 2022 NOPR, DOE proposed to amend the existing test procedure for BVMs by referencing the most recent industry test standard, providing setup instructions for non-beverage shelves, updating the LAPT definition and instructions, requiring testing of coin and bill payment mechanisms if shipped with the BVM (but not until the compliance date of any amended energy conservation standards), specifying setup instructions for leak mitigation controls, and removing the obsolete appendix A. 87 FR 18936, 18949. DOE tentatively determined that these proposed amendments would not impact testing costs. *Id.* DOE requested comment on the tentative determination that manufacturers would not incur any additional costs as a result of the proposed amended test procedure. *Id.* DOE also requested comment on its estimate of per-test costs, should manufacturers retest their BVM basic models to comply with any future amended BVM energy conservation standards. *Id.*

NAMA commented that it believes several of the changes discussed and proposed in the NOPR are burdensome and will not assist DOE in ascertaining more accurate energy use of BVMs. (NAMA, No. 14, p. 2)

NAMA commented that at the time of the May 2021 RFI, the industry was struggling during the height of the COVID-19 pandemic. *Id.* NAMA stated that many member company businesses shut down and the entire industry was trying to survive with factories shuttered, employees working from home, and low sales. *Id.* NAMA

commented that it appreciates DOE's understanding that the industry has faced a tumultuous period and is still working to return to pre-pandemic levels. *Id.*

NAMA commented that it agrees in principle with having tests for energy use and energy efficiency when appropriate, when necessary, and when limited in scope. (NAMA, No. 14, p. 9) NAMA noted, however, that many of the commenters represent organizations that do not have to spend hundreds of person-hours every week conducting tests or incur the cost of using outside laboratories. *Id.* NAMA commented that while it is easy for such organizations to comment in favor of additional tests, these additional tests will not bring more overall accuracy, rather only additional costs, and will do so when this manufacturing segment is just recovering from a period of economic downturn due to the COVID-19 pandemic. *Id.*

Other than the proposed amendment to measure coin and bill payment mechanisms, the proposals in the March 2022 NOPR were generally consistent with requirements under the current DOE test procedure. As discussed in section III.C.5 of this final rule, DOE is not amending the test provisions with regard to payment mechanisms as it proposed to do in the March 2022 NOPR. Instead, DOE has determined to maintain the current test provisions, which specify a default 0.2 kWh/day adder. As a result, the amendments in this final rule harmonize with the industry standard or provide additional test instructions but do not substantively change testing as currently required in appendix B.

As discussed, the amendments improve the clarity of the DOE test procedure while not substantively changing the current test approach. As a result, DOE has determined that the amendments will not result in any additional costs for manufacturers,

and manufacturers will be able to rely on data generated under the current test procedure for BVMs already available on the market.

2. Harmonization with Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA), or estimated operating costs of that product during a representative average use cycle or period of use. 10 CFR 431.4; section 8(c) of appendix A of 10 CFR part 430, subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

As discussed, the test procedure at appendix B incorporates by reference ANSI/ASHRAE Standard 32.1-2010. This standard provides definitions, test conditions, and test methods for measuring refrigerated volume and energy consumption of BVMs. In the March 2022 NOPR, DOE requested comments on the benefits and burdens of the proposed updates and additions to industry standards referenced in the test procedure for BVMs. 87 FR 18936, 18950.

DOE did not receive comments in response to this topic. Consistent with the March 2022 NOPR, DOE notes that the BVM test procedure at appendix B includes a number of deviations to ANSI/ASHRAE Standard 32.1-2010. Specifically, appendix B refers only to certain sections of ANSI/ASHRAE Standard 32.1-2010, includes additional definitions, provides detailed setup and settings instructions, accounts for operation in low power modes and payment mechanism energy consumption, and provides rounding instructions. These deviations were established to limit test burden (*i.e.*, by not requiring

additional testing as specified in ANSI/ASHRAE Standard 32.1-2010), improve representativeness, and improve repeatability and reproducibility of the DOE test procedure as compared to the procedure in ANSI/ASHRAE Standard 32.1-2010. Consistent with the March 2022 NOPR proposals, DOE is amending the test procedure to incorporate by reference the most recent version of the industry standard, ANSI/ASHRAE Standard 32.1-2022. This version of the standard addresses certain deviations between appendix B and ANSI/ASHRAE Standard 32.1-2010. For other deviations not addressed in ANSI/ASHRAE Standard 32.1-2022, DOE has determined that the existing deviations in appendix B are necessary and appropriate.

E. Effective and Compliance Dates

The effective date for the adopted test procedure amendment will be 30 days after publication of this final rule in the *Federal Register*. EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 180 days after publication of the final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563, and 14094

Executive Order (E.O.) 12866, “Regulatory Planning and Review,” as supplemented and reaffirmed by E.O. 13563, “Improving Regulation and Regulatory

Review,” 76 FR 3821 (Jan. 21, 2011) and E.O. 14094, “Modernizing Regulatory Review,” 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB) has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit “significant regulatory actions” to OIRA for review. OIRA has determined that this final regulatory action does not constitute a “significant regulatory action” under section 3(f) of E.O.

12866. Accordingly, this action was not submitted to OIRA for review under E.O.

12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of a final regulatory flexibility analysis (FRFA) for any final rule where the agency was first required by law to publish a proposed rule for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003 to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: www.energy.gov/gc/office-general-counsel. DOE reviewed this final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

DOE has concluded that this final rule would not have a significant impact on a substantial number of small entities. The factual basis for this certification is as follows:

For manufacturers of BVMs, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as “small businesses” for the purposes of the statute. DOE used the SBA’s small business size standards to determine whether any small entities would be subject to the requirements of the rule. In 13 CFR 121.201, the SBA sets a threshold of 1,000 employees or fewer for an entity to be considered as a small business for this category. The equipment covered by this rule is

classified under North American Industry Classification System (NAICS) code 333310,¹⁹

“Commercial and Service Industry Manufacturing.”

DOE used publicly available information to identify small businesses that manufacture BVMs covered in this rulemaking. DOE identified seven companies that are original equipment manufacturers (OEMs) of BVMs covered by this rulemaking. DOE screened out companies that do not meet the definition of a “small business” or are foreign-owned and operated. DOE identified three small, domestic OEMs using subscription-based business information tools to determine the number of employees and revenue of the potential small businesses.

Given that DOE is referencing the prevailing industry test procedure and maintaining a test procedure that is generally consistent with the existing requirements, DOE has determined the test procedure in this final rule would not increase burden for BVM manufacturers, including small businesses, or result in manufacturers needing to rerate BVMs.

Therefore, on the basis of there being no change in compliance burden, DOE certifies that this final rule does not have a “significant economic impact on a substantial number of small entities,” and that the preparation of a FRFA is not warranted. DOE transmitted a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of BVMs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must

¹⁹ The size standards are listed by NAICS code and industry description and are available at: www.sba.gov/document/support--table-size-standards (last accessed on December 22, 2022).

first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including BVMs. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

DOE is not amending the certification or reporting requirements for BVMs in this final rule. Instead, DOE may consider proposals to amend the certification requirements and reporting for BVMs under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910-1400 at that time, as necessary.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for BVMs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has

determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, “Federalism,” 64 FR 43255 (August 4, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE examined this final rule and determined that it will not have a substantial direct effect on the States, on the relationship between the National Government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following

requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this final rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant

intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.energy.gov/gc/office-general-counsel. DOE examined this final rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This final rule will not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights,” 53 FR 8859 (March 18, 1988), that this regulation will not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB’s guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE’s guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to

OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf. DOE has reviewed this final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (FTC) concerning the impact of the commercial or industry standards on competition.

The modifications to the test procedure for BVMs adopted in this final rule incorporates testing methods contained in certain sections of the following commercial standards: ANSI/ASHRAE Standard 32.1-2022, including reference to AHAM HRF-1-2016. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.*, whether they were developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule before its effective date. The report will state that it has been determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

N. Description of Materials Incorporated by Reference

AHAM HRF-1-2016 is referenced by ANSI/ASHRAE Standard 32.1-2022 as the industry-accepted method for determining refrigerated volume for BVMs. By reference

to ANSI/ASHRAE Standard 32.1-2022, the test procedure adopted in this final rule refers only to the refrigerated volume section of AHAM HRF-1-2016. AHAM HRF-1-2016 can be purchased at www.aham.org/AHAM/Store.

ANSI/ASHRAE Standard 32.1-2022 is an industry-accepted test procedure that measures capacity and efficiency of BVMs. The test procedure adopted in this final rule references various sections of ANSI/ASHRAE Standard 32.1-2022 that address definitions, test setup, instrumentation, test conduct, and calculations. ANSI/ASHRAE Standard 32.1-2022 is readily available at ANSI's website at webstore.ansi.org.

V. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this final rule.

List of Subjects in 10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation test procedures, Incorporation by reference, Reporting and recordkeeping requirements.

Signing Authority

This document of the Department of Energy was signed on April 25, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on April 25, 2023.

Treena V. Garrett
Federal Register Liaison Officer,
U.S. Department of Energy

For the reasons stated in the preamble, DOE amends part 431 of chapter II of title 10, Code of Federal Regulations as set forth below:

**PART 431 -- ENERGY EFFICIENCY PROGRAM FOR CERTAIN
COMMERCIAL AND INDUSTRIAL EQUIPMENT**

1. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291-6317; 28 U.S.C. 2461 note.

2. Section 431.293 is revised to read as follows:

§431.293 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the DOE must publish a document in the *Federal Register* and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at DOE, and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 1000 Independence Ave SW, EE-5B, Washington, DC 20585, (202) 586-9127, Buildings@ee.doe.gov, <https://www.energy.gov/eere/buildings/building-technologies-office>. For information on the availability of this material at NARA, visit www.archives.gov/federal-register/cfr/ibr-locations.html or email fr.inspection@nara.gov. The material may be obtained from the sources in the following paragraphs of this section:

(b) *AHAM*. Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036; (202) 872-5955; www.aham.org.

(1) AHAM HRF-1-2016, *Energy and Internal Volume of Refrigerating Appliances*, copyright 2016; IBR approved for appendix B to this subpart.

(2) [Reserved]

(c) *ASHRAE*. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, NE., Atlanta, GA 30329; (404) 636-8400; www.ashrae.org.

(1) ANSI/ASHRAE Standard 32.1-2022 (ANSI/ASHRAE 32.1), *Methods of Testing for Rating Refrigerated Vending Machines for Sealed Beverages*, approved December 30, 2022; IBR approved for §431.292 and appendix B to this subpart.

(2) [Reserved]

(d) *ASTM*. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959; (877) 909-2786; www.astm.org.

(1) ASTM E 1084-86 (Reapproved 2009), *Standard Test Method for Solar Transmittance (Terrestrial) of Sheet Materials Using Sunlight*, approved April 1, 2009; IBR approved for §431.292.

(2) [Reserved]

Appendix A to Subpart Q of Part 431 [Removed and Reserved]

3. Remove and reserve appendix A to subpart Q of part 431.
4. Appendix B to subpart Q of part 431 is revised to read as follows:

Appendix B to Subpart Q of Part 431 – Uniform Test Method for the Measurement of Energy Consumption of Refrigerated Bottled or Canned Beverage Vending Machines

NOTE: Manufacturers must use the results of testing under this appendix to determine compliance with the relevant standards for refrigerated bottled or canned beverage vending machines at 10 CFR 431.296, revised as of January 1, 2023. Specifically, before **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**, representations must be based upon results generated either under this appendix as codified on **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**, or under 10 CFR part 431, subpart Q, appendix B, revised as of January 1, 2023. Any representations made on or after **[INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**, must be made based upon results generated using this appendix as codified on **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

0. Incorporation by reference

DOE incorporated by reference in §431.293 the entire standard for AHAM HRF-1-2016 and ANSI/ASHRAE Standard 32.1-2022; however, only enumerated provisions of those documents are applicable to this appendix as follows:

0.1. AHAM HRF-1-2016

- (a) Section 4, “Method for Computing Refrigerated Volume of Refrigerators, Refrigerator-Freezer, Wine Chillers, and Freezers” as referenced in section 3.1 of this appendix.
- (b) Reserved.

0.2. ANSI/ASHRAE Standard 32.1-2022

- (a) Section 3, “Definitions,” as referenced in section 1 of this appendix.
- (b) Section 4, “Instruments,” as referenced in section 2 of this appendix.
- (c) Section 5, “Vending Machine Capacity,” and Normative Appendix C, “Measurement of Volume,” as referenced in sections 2 and 3.1 of this appendix.
- (d) Section 6, “Test Conditions,” as referenced in section 2 of this appendix.
- (e) Section 7.1, “Test Procedures – General Requirements” (except Section 7.1.2, “Functionality,” and Section 7.1.5.1, “Beverage Temperature Test Packages”), and Section 7.2, “Energy Consumption Test,” (except Section 7.2.2.6), as referenced in sections 1 and 2 of this appendix.

1. *General.* In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over ANSI/ASHRAE Standard 32.1-2022.

1.1 *Definitions.* In addition to the definitions specified in Section 3, “Definitions,” of ANSI/ASHRAE Standard 32.1-2022, the following definitions are also applicable to this appendix.

Accessory low power mode means a state in which a beverage vending machine's lighting and/or other energy-using systems are in low power mode, but that is not a refrigeration low power mode. Functions that may constitute an accessory low power mode may include, for example, dimming or turning off lights, but does not include adjustment of the refrigeration system to elevate the temperature of the refrigerated compartment(s).

External accessory standby mode means the mode of operation in which any external, integral customer display signs, lighting, or digital screens are connected to main power; do not produce the intended illumination, display, or interaction functionality; and can be switched into another mode automatically with only a remote user-generated or an internal signal.

Low power mode means a state in which a beverage vending machine's lighting, refrigeration, and/or other energy-using systems are automatically adjusted (without user intervention) such that they consume less energy than they consume in an active vending environment.

Lowest application product temperature means either:

(a) For units that operate only at temperatures above the integrated average temperature specified in Table 1 of ANSI/ASHRAE Standard 32.1-2022, the lowest integrated average temperature a given basic model is capable of maintaining so as to comply with the temperature stabilization requirements specified in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022; or

(b) For units that operate only at temperatures below the integrated average temperature specified in Table 1 of ANSI/ASHRAE Standard 32.1-2022, the highest integrated average temperature a given basic model is capable of maintaining so as to comply with the temperature stabilization requirements specified in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022.

Refrigeration low power mode means a state in which a beverage vending machine's refrigeration system is in low power mode because of elevation of the temperature of the refrigerated compartment(s). To qualify as low power mode, the unit must satisfy the requirements described in section 2.3.2.1 of this appendix.

1.2 [Reserved]

2. *Test Procedure.* Conduct testing according to section 4, "Instruments"; section 5, "Vendible Capacity"; section 6, "Test Conditions"; section 7.1, "Test Procedures – General Requirements" (except Section 7.1.2 "Functionality" and section 7.1.5.1 "Beverage Temperature Test Packages"); and section 7.2, "Energy Consumption Test" (except section 7.2.2.6) of ANSI/ASHRAE Standard 32.1-2022, except as described in the following sections.

2.1. *Lowest Application Product Temperature.* If a refrigerated bottled or canned beverage vending machine is not capable of maintaining an integrated average temperature of 36 °F (± 1 °F) during the 24-hour test period, the unit must be tested at the lowest application product temperature, as defined in section 1.1 of this appendix.

2.2. *Equipment Installation and Test Setup.* Except as provided in this section 2.2 of this appendix, the test procedure for energy consumption of refrigerated bottled or canned beverage vending machines shall be conducted in accordance with the methods specified in sections 7.1 through 7.2.2.7 under "Test Procedures" of ANSI/ASHRAE Standard 32.1-2022.

2.2.1. *Equipment Loading.* Configure refrigerated bottled or canned beverage vending machines to hold the maximum number of standard products.

2.2.1.1. *Non-Beverage Shelves.* Any shelves within the refrigerated compartment(s) for non-beverage merchandise only shall not be loaded for testing.

2.2.1.2. *Standard Products.* The standard product shall be standard 12-ounce aluminum beverage cans filled with a liquid with a density of 1.0 grams per milliliter (“g/mL”) ± 0.1 g/mL at 36 °F. For product storage racks that are not capable of vending 12-ounce cans, but are capable of vending 20-ounce bottles, the standard product shall be 20-ounce plastic bottles filled with a liquid with a density of 1.0 g/mL ± 0.1 g/mL at 36 °F. For product storage racks that are not capable of vending 12-ounce cans or 20-ounce bottles, the standard product shall be the packaging and contents specified by the manufacturer in product literature as the standard product (*i.e.*, the specific merchandise the refrigerated bottled or canned beverage vending machine is designed to vend).

2.2.1.3. *Standard Test Packages.* A standard test package is a standard product, as specified in section 2.2.1.2 of this appendix, altered to include a temperature-measuring instrument at its center of mass.

2.2.2. *Sensor Placement.* The integrated average temperature of next-to-vend beverages shall be measured in standard test packages in the next-to-vend product locations specified in section 7.1.5.2 of ANSI/ASHRAE Standard 32.1-2022. Do not run the thermocouple wire and other measurement apparatus through the dispensing door; the thermocouple wire and other measurement apparatus must be configured and sealed so as to minimize air flow between the interior refrigerated volume and the ambient room air. If a manufacturer chooses to employ a method other than routing thermocouple and sensor wires through the door gasket and ensuring the gasket is compressed around the wire to ensure a good seal, then it must maintain a record of the method used in the data underlying that basic model’s certification pursuant to 10 CFR 429.71.

2.2.3. *Vending Mode Test Period.* The vending mode test period begins after temperature stabilization has been achieved, as described in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022 and continues for 18 hours for equipment with an accessory low

power mode or for 24 hours for equipment without an accessory low power mode. For the vending mode test period, equipment with energy-saving features that cannot be disabled shall have those features set to the most energy-consuming settings, except for as specified in section 2.2.4 of this appendix. In addition, all energy management systems shall be disabled. Provide, if necessary, any physical stimuli or other input to the machine needed to prevent automatic activation of low power modes during the vending mode test period.

2.2.4. Accessory Low Power Mode Test Period. For equipment with an accessory low power mode, the accessory low power mode may be engaged for 6 hours, beginning 18 hours after the temperature stabilization requirements established in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022 have been achieved, and continuing until the end of the 24-hour test period. During the accessory low power mode test, operate the refrigerated bottled or canned beverage vending machine with the lowest energy-consuming lighting and control settings that constitute an accessory low power mode. The specification and tolerances for integrated average temperature in Table 2 of ANSI/ASHRAE Standard 32.1-2022 still apply, and any refrigeration low power mode must not be engaged. Provide, if necessary, any physical stimuli or other input to the machine needed to prevent automatic activation of refrigeration low power modes during the accessory low power mode test period.

2.2.5. Accessories. Unless specified otherwise in this appendix or ANSI/ASHRAE Standard 32.1-2022, all standard components that would be used during normal operation of the basic model in the field and are necessary to provide sufficient functionality for cooling and vending products in field installations (*i.e.*, product inventory, temperature management, product merchandising (including, *e.g.*, lighting or signage), product selection, and product transport and delivery) shall be in place during testing and shall be set to the maximum energy-consuming setting if manually adjustable. Components not

necessary for the inventory, temperature management, product merchandising (*e.g.*, lighting or signage), product selection, or product transport and delivery shall be de-energized. If systems not required for the primary functionality of the machine as stated in this section cannot be de-energized without preventing the operation of the machine, then they shall be placed in the lowest energy-consuming state. Components with controls that are permanently operational and cannot be adjusted by the machine operator shall be operated in their normal setting and consistent with the requirements of sections 2.2.3 and 2.2.4 of this appendix. The specific components and accessories listed in the subsequent sections shall be operated as stated during the test, except when controlled as part of a low power mode during the low power mode test period.

2.2.5.1. Payment Mechanisms. Refrigerated bottled or canned beverage vending machines shall be tested with no payment mechanism in place, the payment mechanism in place but de-energized, or the payment mechanism in place but set to the lowest energy-consuming state, if it cannot be de-energized. A default payment mechanism energy consumption value of 0.20 kWh/day shall be added to the primary rated energy consumption per day, as noted in section 2.3 of this appendix.

2.2.5.2. Internal Lighting. All lighting that is contained within or is part of the internal physical boundary of the refrigerated bottled or canned beverage vending machine, as established by the top, bottom, and side panels of the equipment, shall be placed in its maximum energy-consuming state.

2.2.5.3. External Customer Display Signs, Lights, and Digital Screens. All external customer display signs, lights, and digital screens that are independent from the refrigeration or vending performance of the refrigerated bottled or canned beverage vending machine must be disconnected, disabled, or otherwise de-energized for the duration of testing. Customer display signs, lighting, and digital screens that are integrated into the beverage vending machine cabinet or controls such that they cannot be

de-energized without disabling the refrigeration or vending functions of the refrigerated bottled or canned beverage vending machine or modifying the circuitry must be placed in external accessory standby mode, if available, or their lowest energy-consuming state. Digital displays that also serve a vending or money processing function must be placed in the lowest energy-consuming state that still allows the money processing feature to function.

2.2.5.4. Anti-sweat or Other Electric Resistance Heaters. Anti-sweat or other electric resistance heaters must be operational during the entirety of the test procedure. Units with a user-selectable setting must have the heaters energized and set to the most energy-consumptive position. Units featuring an automatic, non-user-adjustable controller that turns on or off based on environmental conditions must be operating in the automatic state. Units that are not shipped with a controller from the point of manufacture, but are intended to be used with a controller, must be equipped with an appropriate controller when tested.

2.2.5.5. Condensate Pan Heaters and Pumps. All electric resistance condensate heaters and condensate pumps must be installed and operational during the test. Prior to the start of the test, including the 24-hour period used to determine temperature stabilization prior to the start of the test period, as described in section 7.2.2.2 of ANSI/ASHRAE Standard 32.1-2022, the condensate pan must be dry. For the duration of the test, including the 24-hour time period necessary for temperature stabilization, allow any condensate moisture generated to accumulate in the pan. Do not manually add or remove water from the condensate pan at any time during the test. Any automatic controls that initiate the operation of the condensate pan heater or pump based on water level or ambient conditions must be enabled and operated in the automatic setting.

2.2.5.6. Illuminated Temperature Displays. All illuminated temperature displays must be energized and operated during the test the same way they would be energized and

operated during normal field operation, as recommended in manufacturer product literature, including manuals.

2.2.5.7. Condenser Filters. Remove any nonpermanent filters provided to prevent particulates from blocking a model's condenser coil.

2.2.5.8. Security Covers. Remove any devices used to secure the model from theft or tampering.

2.2.5.9. General Purpose Outlets. During the test, do not connect any external load to any general purpose outlets available on a unit.

2.2.5.10. Crankcase Heaters and Other Electric Resistance Heaters for Cold Weather.

Crankcase heaters and other electric resistance heaters for cold weather must be operational during the test. If a control system, such as a thermostat or electronic controller, is used to modulate the operation of the heater, it must be activated during the test and operated in accordance with the manufacturer's instructions.

2.2.5.11. Refrigerant Leak Mitigation Controls. Any refrigerant leak mitigation controls that are independent from the refrigeration or vending performance of the refrigerated bottled or canned beverage vending machine must be disconnected, disabled, or otherwise de-energized for the duration of testing. Refrigerant leak mitigation controls that are integrated into the refrigerated bottled or canned beverage vending machine cabinet or controls such that they cannot be de-energized without disabling the refrigeration or vending functions of the refrigerated bottled or canned beverage vending machine or modifying the circuitry must be placed in external accessory standby mode, if available, or their lowest energy-consuming state.

2.3. Determination of Daily Energy Consumption. The daily energy consumption shall be equal to the primary rated energy consumption per day (ED), in kWh, determined in accordance with the calculation procedure in section 7.2.3.1, "Calculation of Daily Energy Consumption," of ANSI/ASHRAE Standard 32.1-2022 plus the default payment

mechanism energy consumption value from section 2.2.5.1 of this appendix, if applicable. In section 7.2.3.1 of ANSI/ASHRAE Standard 32.1-2022, the energy consumed during the test shall be the energy measured during the vending mode test period and accessory low power mode test period, as specified in sections 2.2.3 and 2.2.4 of this appendix, as applicable.

2.3.1. Refrigeration Low Power Mode. For refrigerated bottled or canned beverage vending machines with a refrigeration low power mode, multiply the value determined in section 2.3 of this appendix by 0.97 to determine the daily energy consumption of the unit tested. For refrigerated bottled or canned beverage vending machines without a refrigeration low power mode, the value determined in section 2.3 of this appendix is the daily energy consumption of the unit tested.

2.3.1.1. Refrigeration Low Power Mode Validation Test Method. This test method is not required for the certification of refrigerated bottled or canned beverage vending machines. To verify the existence of a refrigeration low power mode, initiate the refrigeration low power mode in accordance with manufacturer instructions contained in product literature and manuals, after completion of the 6-hour low power mode test period. Continue recording all the data specified in section 7.2.2.3 of ANSI/ASHRAE Standard 32.1-2022 until existence of a refrigeration low power mode has been confirmed or denied. The refrigerated bottled or canned beverage vending machine shall be deemed to have a refrigeration low power mode if either:

(a) The following three requirements have been satisfied:

(1) The instantaneous average next-to-vend beverage temperature must reach at least 4 °F above the integrated average temperature or lowest application product temperature, as applicable, within 6 hours.

(2) The instantaneous average next-to-vend beverage temperature must be maintained at least 4 °F above the integrated average temperature or lowest application product temperature, as applicable, for at least 1 hour.

(3) After the instantaneous average next-to-vend beverage temperature is maintained at or above 4 °F above the integrated average temperature or lowest application product temperature, as applicable, for at least 1 hour, the refrigerated beverage vending machine must return to the specified integrated average temperature or lowest application product temperature, as applicable, automatically without direct physical intervention.

(b) The compressor does not cycle on for the entire 6-hour period, in which case the instantaneous average beverage temperature does not have to reach 4 °F above the integrated average temperature or lowest application product temperature, as applicable, but, the equipment must still automatically return to the integrated average temperature or lowest application product temperature, as applicable, after the 6-hour period without direct physical intervention.

2.3.2. Calculations and Rounding. In all cases, the daily energy consumption must be calculated with raw measured values and the final result rounded to units of 0.01 kWh/day.

3. Determination of Refrigeration Volume and Surface Area.

3.1. Refrigerated Volume. Determine the “refrigerated volume” of refrigerated bottled or canned beverage vending machines in accordance with section 5.3, “Refrigerated Volume,” and Appendix C, “Measurement of Volume,” of ANSI/ASHRAE Standard 32.1-2022 including the referenced methodology in section 4, “Method for Computing Refrigerated Volume of Refrigerators, Refrigerator-Freezer, Wine Chillers, and Freezers,” of AHAM HRF-1-2016. For combination vending machines, the “refrigerated volume” does not include any non-refrigerated compartment(s).

3.2. *Determination of Surface Area.* (Note: This section is not required for the certification of refrigerated bottled or canned beverage vending machines.) Determine the surface area of each beverage vending machine as the length multiplied by the height of outermost surface of the beverage vending machine cabinet, measured from edge to edge excluding any legs or other protrusions that extend beyond the dimensions of the primary cabinet. Determine the transparent and non-transparent areas on each side of a beverage vending machine as the total surface area of material that is transparent or is not transparent, respectively.

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